

Access to Healthy Food in Rural Maryland: The Potential of Small Stores

by
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Abstract

Background

The obesity epidemic and concomitant increased risk of chronic disease have affected millions of Americans. In an effort to reduce obesity and the risk of chronic disease, interventions have focused on changing the built food environment including small retail food stores. Small retail food stores are characterized by a product assortment that centers on foods and beverages that are high in fat, sugar, or sodium with a narrow selection of health promoting foods. There is a high concentration of small retail food stores in the food environment, particularly in areas that are underserved by larger stores that offer a greater variety of healthy foods. Although research has been widely conducted in metropolitan areas to promote the sales of healthy foods in small food stores, there is a paucity of data on healthy foods in rural small stores in the United States. The purpose of this thesis is to examine the potential utilization of small retail food stores in seven rural Maryland counties as a platform for increasing access to healthy foods.

Methods

This thesis utilized qualitative and quantitative data collection and analysis. For the qualitative data, in-depth interviews (IDI) were conducted with regular small store customers to examine their perspectives on healthy foods and factors surrounding their food choices. Thirteen IDIs were conducted with small store owners to explore their perspectives on healthy foods and the role healthy foods play in their businesses. A quantitative survey was conducted with 312 regular small store customers to investigate customer demographics as well as food-related psychosocial factors, the frequency of

small store utilization, food purchasing, food and vegetable intake, and dietary fat.

Observational data was collected in 34 small stores on the stocking of healthy foods. A subset of 222 customer surveys was combined with the observational data to examine the relationships between the healthy foods available in small stores and customer purchasing, fruit and vegetable intake, and dietary fat.

Results

A variety of store types were sampled including convenience stores, gas stations, liquor stores, and small, independent grocers reflecting the heterogeneity of small food stores in rural Maryland. Regular customers of small stores had a high utilization of the stores. Customers noted that distance to the nearest supermarket and available time were barriers to healthy food purchasing. Small store owners reported low skills in pricing, sales, and marketing and perceived that the market for healthy foods in their stores was low. The items that respondents reported purchasing with the greatest frequency were sodas, bottled water, and fruits; frequency of fresh vegetables was relatively high compared to other items on the survey. However, among the customers surveyed, fruit and vegetable intake was low and more than half the respondents reportedly ate less than 2.5 servings per day. More than 75% of respondents reported having a healthy intake of fat. In the regression models, a partial relationship was found between high-fat and/or high-sugar snack purchasing frequency and healthy snack availability in rural Maryland small food stores, when controlling for store visits in the previous 30 days, a proxy for frequency of exposure to the food environment, sex, age, education, and employment status. However, regression models examining the relationship between the availability of low calorie beverages in the store and sugar-sweetened beverage (SSB) purchasing and

the number of varieties of fresh fruits in stock in the small store, and the daily reported fruit and vegetable intake, and overall healthy food availability in the small store and dietary fat did not find a statistically significant relationship.

Conclusions

The regular small store customers who participated in this study had a very frequent number of visits per month to small stores indicating a high exposure to the small store food environment. Although the relationships between the food environment and food purchasing and dietary intakes were weak in the quantitative analysis, the qualitative analysis indicated that there may be discrepancies in the level of sales and marketing skills among store owners that may confound the relationships in the models. Future work in rural Maryland small stores will need to build both the supply and demand for healthy foods in order if increasing long-term access through small stores is to be a viable business venture

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“Education, in the broadest of truest sense, will make an individual seek to help all people, regardless of race, regardless of color, regardless of condition.”

George Washington Carver

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Chapter 1: Introduction

1.1 Problem Statement

The obesity epidemic plagues millions of Americans; 34.9% of American adults are obese (Ogden et al., 2014). In terms of geographic distribution, obesity affects a greater percentage of rural residents than it does urban. The prevalence of obesity in the rural U.S. is 39.6% compared to 33.4% for urban residents (Befort et al., 2012). In Maryland, chronic diseases related to obesity also have a higher prevalence in rural areas than in urban. The prevalence of high blood pressure is 32.3% in rural versus 25.8% in urban and 8.8% versus 7.0% for diabetes (Maryland Department of Health and Mental Hygiene [MDHMH], 2007).

The potential for consuming a healthy diet, and consequent obesity and diet-related chronic disease, is constrained by access to healthy foods. Rural areas are typically sparsely populated, with few food sources (Liese et al., 2007). In Kansas, researchers found that there were 0.92 supermarkets per 10,000 residents in metropolitan areas compared to 0.57 in rural areas (Ford and Dzewaltowski, 2010). In contrast, there were 3.23 convenience stores per 10,000 population in metropolitan areas compared to 7.45 in rural areas (Ford and Dzewaltowski, 2010). Rural areas have fewer supermarkets but there are a greater proportion of convenience stores.

Researchers have observed that when people live closer to supermarkets than convenience stores, there is a lower associated risk of obesity (Morland et al., 2006; Morland & Evenson., 2009; Larson et al., 2009). Supermarkets make healthy foods accessible including fresh produce. Convenience stores carry a narrow range of less

healthy foods including chips, packaged baked goods, sodas, and candy; fresh produce tends to be absent (Bustillos et al., 2009). Given their association with overweight, obesity, and lack of healthy food, small stores have been the site for numerous studies aiming to increase the supply of healthy food. Studies examining consumer purchasing habits have been conducted to understand how intervention efforts should be targeted (Borradaile et al., 2009; D'Angelo et al., 2011; Martin et al., 2012; Sherman et al., 2015); these studies have largely focused on urban areas. Little is known about rural small store customer purchasing habits and, therefore, the demand for healthy foods in rural small stores. The motivations and issues surrounding small store owners' decisions to stock healthy foods has been investigated in a variety of urban settings (Andreyeva et al., 2012; Ayala et al., 2012; Dannefer et al., 2012; Gittelsohn et al., 2008; Gittelsohn et al., 2012; Gravlee et al., 2014; O'Malley et al., 2013), but less is known about rural stores (Pitts et al., 2013b).

The interest of this thesis is to explore the use of small stores in rural Maryland as a platform for increasing access to healthy foods. Qualitatively, this thesis explores the perspectives of small store owners and customers on healthy foods and the factors surrounding the role these foods play in small rural food stores. This thesis seeks to describe the regular small store customer, those who visit the small store once a week or more, in rural Maryland by exploring the demographics and factors surrounding food choice and diet such as food-related psychosocial variables, purchasing habits, and dietary intakes. Finally, this thesis examines the relationship between the retail environment and food purchasing and diet. The specific aims, research questions, and hypotheses investigated in this thesis are:

Aim 1: To understand the perspectives and behaviors related to food purchasing of small store customers in rural Maryland.

Research question 1A: What food sources are used by rural Maryland small store customers?

Research question 1B: How do knowledge and information about nutrition influence food purchasing?

Research question 1C: What are the facilitators and barriers to healthy food purchasing?

Research question 1D: How can rural Maryland small store customers be encouraged to purchase healthy foods?

Aim 2: To understand the perspectives of rural Maryland small store owners on healthy foods and their behaviors related to food sales.

Research Question 2A: How do small store owners in rural Maryland perceive their customer base and popular products?

Research Question 2B: How do small rural store owners set prices?

Research Question 2C: What is the experience of store owners in terms of merchandising and promotion?

Research Question 2D: What are store owners' perceptions of healthy foods and the role the foods play in their businesses?

Aim 3: To explore factors surrounding food choices among small store customers in rural Maryland.

Research Question 3A: What are the small store utilization motives and habits of regular rural small food store customers in Maryland?

Research Question 3B: What are the customer food purchasing and dietary habits?

Research Question 3C: To examine food-related psychosocial characteristics including nutrition knowledge, food-related self-efficacy, and behavioral intentions.

Aim 4: To investigate the relationships between the small store food environment and food purchasing and dietary intakes among small store customers in rural Maryland.

Hypothesis 4A: Customers will make less frequent purchases of sugar-sweetened beverages (SSB) and unhealthy snacks if healthier alternatives are available in the small rural food stores they use.

Hypothesis 4B: Customers of small stores that stock a larger number of healthy foods will have a higher intake of fruits and vegetables and a lower intake of dietary fat.

1.2 Summary of the Thesis Chapters

This thesis consists of eight chapters including this introduction. Chapter 2 provides a background of the current literature surrounding healthy foods and small retail food stores including previous investigations into the rural small store food environment and interventions aimed at increasing access to healthy foods in urban and rural small stores. Chapter 3 describes the methods used for data collection and analysis including the study design, data collection procedures, and qualitative and quantitative analyses conducted. For Chapter 4, an analysis of IDIs conducted with small store customers was explored to examine their perspectives on healthy foods and factors surrounding their food choices to answer the research questions for Aim 1. Chapter 5 is a qualitative

analysis of in-depth interviews (IDI) conducted with small store owners exploring their perspectives on healthy foods and the role healthy foods play in their businesses to answer the research questions presented in Aim 2. Chapter 6 describes the regular small store customer in rural Maryland via an analysis of the survey data collected from small store customers was conducted to answer the research questions in Aim 3. In chapter 6, the demographics of regular small store customers are explored as well as food-related psychosocial factors, the frequency of small store utilization, food purchasing, food and vegetable intake, and dietary fat. The quantitative analysis in Chapter 7 investigated the relationship between the food environment and food purchasing and markers of diet quality, fruit and vegetable intake and dietary fat. For this chapter, a survey of the foods stocked in the small stores was used to quantify the level of healthy foods in the retail food environment. This data, together with data from the customer survey examined in chapter 4, was used to examine the hypotheses proposed for Aim 4. Chapter 8 discusses the main findings of the thesis, examines the strengths and limitations, and discusses future directions for research and policy.

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Chapter 2: Background

This chapter describes the scientific basis of the investigation conducted by this thesis. The impact of obesity is discussed as the rationale for this thesis which seeks to investigate the use of small food stores as a platform for increasing access to healthy foods in rural Maryland. The relationship between the built food environment and obesity is discussed as is the relationship between obesity and small stores. Current knowledge of small food stores in the rural food environment and the perspectives of small store owners and customers from qualitative investigations is detailed. Interventions to increase access to healthy foods in small stores are discussed and their results in urban and rural areas. Finally, the previous interventions conducted by the Healthy Stores group and their role as the foundation for the further investigation conducted by the current project is described.

2.1 The burden of obesity

The obesity epidemic is on the forefront of public health research in the US. Recent estimates show that the national prevalence of obesity is 33.8% and of overweight and obesity combined is 68% (Flegal et al., 2010). While the presence of obesity in the American population remains high, studies have shown that the prevalence of obesity seems to have plateaued (Flegal et al., 2010; Ogden et al., 2014). Obesity is a major contributor to some of the leading preventable health conditions. Co-morbidities of obesity include cardiovascular disease, type 2 diabetes, gallbladder disease, chronic back pain, osteoarthritis, asthma, sleep apnea, and some cancers (Guh et al., 2009). With the high numbers of co-morbidities that obesity is responsible for, there is a concomitant

financial burden of the condition (Finkelstein et al., 2009). Finkelstein et al., estimated that obesity contributed 10% to overall U.S. medical spending (2009). Furthermore, the investigators estimated that by 2008 the cost of obesity would be \$147 billion per year (Finkelstein et al., 2009).

2.1.1 Obesity and Chronic Disease in Rural Areas in the US

Rural areas have a higher burden of obesity than urban areas. Estimates garnered from National Health and Nutrition Examination Survey (NHANES) data show that the prevalence of obesity in rural areas is 39.6% versus 33.4% in urban (Befort et al., 2012). In addition to the higher levels of obesity, there is an accompanying higher prevalence in rural areas of the co-morbidities of the disease. One study found that the prevalence of the metabolic syndrome, a group of conditions that included high blood pressure, impaired glucose metabolism, and dyslipidemia, was 39.9% in rural versus 32.8% in urban residents (Trivedi et al., 2013). Another study found that the prevalence of diabetes in rural areas was 8.6% higher than in urban and that the prevalence of coronary heart disease was 38.8% higher in rural versus urban areas (O'Connor & Wellenius, 2012).

2.1.2 Obesity in Rural Maryland

The population of Maryland is ~5.8 million people (U.S. Census Bureau, no date [nd]). Of those ~5.8 million, approximately 13% (~754,000) are residents of rural areas (U.S. Census Bureau, 2010). There are 24 counties in Maryland and 18 are considered rural by the state. The definition of a rural county is any county that does not contain an urban area of at 50,000 residents (Health Resources and Services Administration [HRSA], nd). For the purpose of this chapter, the focus is on the counties designated as

rural by the federal government: Allegany, Caroline, Dorchester, Garrett, Kent, Somerset (5 out of 7 census tracts), St. Mary's, Talbot, and Worcester.

In many demographic measures, rural Maryland fares worse than the rest of the state. Rural Maryland is older; 15.6% of the population is over 65 compared to 11.3% statewide (Maryland Department of Health and Mental Hygiene [MDHMH], 2007). Median income levels in rural Maryland are lower, \$43,594 compared to \$62,000 statewide (MDHMH, 2007). There is a higher unemployment rate, 6.1% in rural Maryland compared to 4.3% statewide. Residents of rural Maryland are at a disadvantage compared to the state overall.

According to the Maryland Department of Health and Mental Hygiene, in comparison with the state overall, rural Maryland has a comparable prevalence of overweight and obesity but a poorer state of health care. The prevalence of overweight and obesity in rural Maryland is 61.1% compared to a similar state average of 57.8% (MDHMH, 2007). There are fewer health care organizations and professionals in rural Maryland including primary care providers and specialists (MDHMH, 2007). For example, there are 28.7% fewer primary care providers per 100,000 residents in rural Maryland as compare to the state overall (MDHMH, 2007). All the rural Maryland counties are either fully or partially designated as medically underserved areas. There is little understanding of the rural food environment in Maryland and how this could be addressed to reduce the risk for chronic disease. This thesis seeks to address one aspect of the rural Maryland food environment, the small food store, as a platform to increase access to healthy foods thereby helping to reduce the risk for chronic disease.

2.2 The built food environment

The built food environment is comprised of the man-made, physical elements in the community that are related to food and eating (Hill and Peters, 1998; Morland et al., 2002; Popkin et al., 2005). Some examples of aspects of the built food environment include small stores, supermarkets, farm stands, carry-out food outlets, and restaurants. Studies examining the effect of the built food environment on obesity have focused on supermarkets, groceries, small stores, fast-food establishments, and similar outlets (Cummins & Macintyre, 2006). The focus of this thesis is the relationship between obesity and small stores. Definitions of small stores vary throughout the literature. In this study, a small store is defined as a store with less than 2,500 square feet of retail space.

2.2.1 The relationship between the built food environment and obesity

Studies examining the relationship between the built food environment and obesity have had equivocal results. A number of studies have found an inverse relationship between the distance of residences to supermarkets and obesity (Dubowitz et al., 2012; Ghosh-Dasitdar et al., 2014; Morland et al., 2006; Morland and Evenson, 2009; Wang et al., 2007). However, other studies have found no relationship between supermarket presence and obesity (Block et al., 2011; Drenowski et al., 2012; Drenowski et al., 2014; Ford and Dzewaltowski, 2010; Gase et al., 2014; Hattori et al., 2013; Macdonald et al., 2011; Michimi and Wimberly, 2010). Interestingly, there has been evidence of a positive relationship between small grocery store density and BMI (Gibson, 2011; Wang et al., 2007). In the investigations of fast food establishment density and BMI, some studies have found a positive relationship (Dubowitz et al., 2012; Inagami et al., 2009; Li et al., 2008; Li et al., 2009; Kruger et al., 2014; Prince et al., 2012) while

others have found no relationship (Block et al., 2011; Hickson et al., 2011) and one found a positive relationship in non-whites but no relationship in whites (Dunn et al., 2012).

In considering the studies that examine the relationship between the built food environment surrounding the home and obesity, a number of methodological issues emerge. The majority of studies used cross-sectional data; only three of the aforementioned studies were longitudinal (Block et al., 2011; Gibson, 2011; Li et al., 2009). Causal relationships cannot be elucidated from the cross-sectional studies. With some exceptions, (Gase et al., 2014; Ghosh-Dastidar et al., 2014; Hickson et al., 2011; Li et al., 2008; Li et al., 2009; Morland and Evenson, 2009), the previously mentioned studies relied on self-reported measures of anthropometrics. It has been shown that self-reported weight tends to be under-reported while height tends to be over-reported (Dekkers et al., 2008). Therefore, the proportion of study participants with obesity may have been underestimated.

There have been differences in the way exposure has been measured particularly in the distance from residence to nearest identified food outlet versus density of outlets in the geographic area of residence. For investigations looking at distance to food outlet, studies have examined the relationship between obesity and distance from home to the respondent's preferred food outlet (Ghosh-Dastidar et al., 2014; Gase et al., 2014), to the nearest food outlet (Block et al., 2011; Macdonald et al., 2011), and comparing distance to the preferred food outlet versus to the nearest food outlet (Drewnowski et al., 2012; Drewnowski et al., 2014).

In studies exploring the relationship between obesity and food outlet density, the density of food outlets within a radius of the respondent's residence has been researched

(Dubowitz et al., 2012; Ford and Dzewaltowski, 2010; Hattori et al., 2013; Hickson et al., 2011; Kruger et al., 2014), as well as the density of food outlets within an area determined by census tract or zip code as a proxy for neighborhood (Gibson, 2011; Inagami et al., 2009; Li et al., 2008; Li et al., 2009; Morland et al., 2006; Morland and Evenson, 2009). Wang et al., examined the relationship between obesity and both the density of food outlets within census tracts or block groups and proximity to the nearest food outlet (2007). Michimi and Waverly used the population-weighted mean distance to the nearest food store to investigate geographic food outlet access and the relationship to obesity (2010).

Because studies examining the relationship between the built food environment and obesity use such varying measures of exposure, it is difficult to make comparisons between studies. Although some studies take the respondent's preferred food outlet into consideration, the majority of studies that examine the food outlets surrounding the home are designed with the assumption that individuals make their decisions on where to buy food based on geography and proximity. Food choice is multi-dimensional and may include factors such as price and food quality. Only looking at geography does not account for other factors that influence an individual's food choice. When using distance to food outlets or density of food outlets as the exposure variable, this fails to account for the differences in product assortment, price, or quality of foods in different food outlets. Finally, most individuals have a travel pattern throughout their day, and it is the aggregation of all the food outlets that the individual is exposed to during their movements that constitute their built food environment. In an article by Kestens et al., the researchers used a measure of exposure they termed "activity space experienced

foodscapes” that consisted of the food environment surrounding each location that respondents had conducted an activity in one day (2010). Although not exhaustive, the approach of Kestens et al., allows for a more comprehensive measure of daily exposure to the built food environment than simply utilizing the area surrounding the home.

2.2.2 The relationship between obesity and small stores

Studies examining the relationship between obesity and small stores have shown mixed results. A number of studies have found no association between obesity and small stores (Block et al., 2011; Ganter et al., 2013; Gibson, 2011; Hattori et al., 2013). The study by Block et al., examined distance from the respondent’s residence to nearest small store (2011); Ganter et al., measured distance to the nearest small store and concentration of small stores within distinct geographical radii of the household (2013); Gibson investigated concentration of small stores within the zip code of residence (2011); and Hattori et al., studied the number of small stores in differing radii of distance from the home (2013). Although the studies discussed have all had similar results, the methods used to measure the presence of small food stores in the built food environment show large differences and bring into question the comparability of the results.

In studies that showed a relationship between obesity and small stores, Morland et al., used census tracts as proxies for neighborhoods to find that the presence of convenience stores was positively associated with overweight and obesity in multiple states (2006). In contrast, the presence of supermarkets was found to be negatively associated with obesity (Morland et al., 2006). However, Morland et al., only measured the presence of one or more of the aforementioned food outlets within the census tract of study (2006). The study does not account for the possibility that census tracts may have

differing concentrations of food outlet; a point that may affect the resulting relationship modeling. In addition, by using census tracts as proxies for neighborhoods instead of centering the measurement of the distance from the home to the food outlet, it is possible that there are residences that are closer to food outlets in other census tracts than in their own census tract.

Other studies have found a positive, significant relationship between obesity and small stores in children and adolescents. Powell et al., studied adolescents in 8th and 10th grade and the geographic measure was the zip code surrounding the respondent's school as a proxy for the school neighborhood built food environment (2007). Similar to Morland et al. (2006), Powell et al., only examined the presence of the food outlet within the zip code, not at the density of food outlets (2007). The investigators found that greater convenience store access was associated with higher body mass index (BMI) and increased chain supermarket availability was associated with lower BMI (Powell, et al., 2007). Laska et al., examined the presence of convenience stores within radii of distance surrounding the home or school of adolescents 10 to 17 years old (2010). Investigators found BMI to be positively associated with the presence of convenience stores within a 1,600-meter buffer area (Laska et al., 2010). The measurement of anthropometrics by the study team was a strength of the investigation, however, the restriction of only examining the presence of convenience stores and not concentration was a limitation. Finally, a study by Kolehlat et al. examined the relationship of obesity to the concentration of convenience stores in the residential neighborhood of three and four-year-olds enrolled in Women, Infants, and Children (WIC) (2012). The proportion of obesity was highest among children in zip codes with greater concentrations of convenience stores (Kolehlat

et al., 2012). The residential zip code was used as a proxy for neighborhood which provides similar limitations as using census tracts as proxies. In addition, gas station convenience stores were not captured by the study.

Although there is some evidence of a relationship between the presence of small stores and obesity, there are limitations to the findings. Overall, the associations tend to be small, and their clinical significance may be limited. The differences in geographic measures of both neighborhood and distance to food outlets present difficulties in comparing the results of the studies. The difference in ages of the respondents also limits the possibility of making comparisons across studies. In addition, convenience stores are being used as a proxy for the availability of unhealthy foods. The research is being conducted under the assumption that only a narrow selection of high-priced healthy foods is available at convenience stores whereas there is a wide selection of low-priced unhealthy foods. The studies do not take into account intra-convenience store differences in price and availability of healthy and unhealthy foods. Finally, similar to supermarkets, researchers examining small stores make the assumption that proximity to a food outlet and frequency of use of that outlet are positively related. The assumption may not necessarily hold true, particularly among individuals who drive. There is a gap in this area of research as most of the studies have focused on populations in metropolitan areas (Block et al., 2011; Koleitat et al., 2012; Laska et al., 2010) or have pooled data from national (Gibson et al., 2011) or statewide samples (Hattori et al., 2013); few studies have specifically focused on rural populations.

2.2.3 The role of small stores in the rural food landscape

Distance is an important factor in accessing food outlets in rural areas. With low population densities, food outlets tend to be broadly distributed in rural areas (McGee et al., 2011). Supermarkets have a lower per capita concentration in rural areas than in urban or suburban areas while convenience stores have a greater per capita concentration (Ford and Dzewaltowski, 2010). In a rural South Carolina county, Liese et al., found that 74% of the food stores were convenience stores (2007). In the ~1,100 square mile county, there were 1.1 supermarkets and 0.7 grocery stores per 100 square miles compared to 5.2 convenience stores (Liese et al., 2007). Distance has been described as a barrier to obtaining food, particularly among the elderly and low-income groups who may have challenges accessing transportation (McGee et al., 2011). Small stores tend to offer a wide variety of snack foods and sugar-sweetened beverages. In rural Texas, Sharkey et al., observed an average of about 86 unique varieties of sugar sweetened beverages and 44 varieties of fried chips compared to 17 varieties of non-sugar sweetened beverages and 3 varieties of baked chips (2012). While items like fried chips and candy were observed at 100% of stores, only about a third of stores offered fresh fruits and vegetables (Sharkey et al., 2012). While it would be ideal for all rural residents to have ready access to the healthy foods available at supermarkets, it is not economically feasible to have high densities of supermarkets in sparsely populated areas. Small stores, however, provide a ubiquitous venue for rural residents to potentially access healthy foods. Small stores require fewer patrons than supermarkets to be solvent and already play an important role in the rural food landscape. It is the interest of this study, therefore, to investigate how small stores in Maryland can provide greater access to healthy foods in rural areas.

2.3 Small store owners' perspectives on stocking healthy foods

Studies have examined the factors that influence store owners' decisions on product stocking; the majority of these studies have collected data in urban areas. The main priority for store owners is sales; both volume and speed (Gravlee et al., 2014). The speed of sales plays an essential role in decisions to carry perishables; without adequate turnover store owners cannot afford to stock them (Gravlee et al., 2014; Gittelsohn et al., 2006). Lack of consumer demand is frequently mentioned as a barrier to stocking healthy foods (Dannefur et al., 2012; Gravlee et al., 2014; O'Malley et al., 2013). There is a perceived lack of consumer demand for healthy foods and a high demand for unhealthy foods (Anderyeva et al., 2011, Pitts et al., 2013b). Retailers also perceive healthy foods to be less profitable than unhealthy foods (Anderyeva et al., 2011). In rural Arizona Native American reservations, formative research conducted with community stakeholders, including food store managers, preceded an intervention to promote and increase access to healthy foods in local stores (Vastine et al., 2005). Store managers were concerned about the health of community members and were willing to stock new healthy food items if profitability was not impacted (Vastine et al., 2005). Other barriers to carrying healthy foods include infrastructure such as lack of space and refrigeration (Dannefur et al., 2012; Gittelsohn et al., 2012; Gravlee et al., 2014). There are supply issues because store owners have difficulties procuring healthy foods due to high minimum orders from direct store delivery suppliers or availability and prices at wholesale clubs (Ayala et al., 2012). Because few studies have investigated the rural small store owners' perspectives on stocking and sales of healthy foods, more research is needed to lay the groundwork for small store interventions in rural areas.

2.4 Customers' perspectives on small rural food stores

There is limited qualitative data available on the perspectives of customers on small rural food stores. Rural customers largely report acquiring the majority of their food at large chain supermarkets (McGee et al., 2011; Scarpello et al., 2009; Yousefian et al., 2011). In rural Maine, respondents who reported traveling longer distances to larger stores would make monthly grocery trips supplemented with trips to small stores (Yousefian et al., 2011). The frequency of trips to small stores ranged from every few days to every two weeks (Yousefian et al., 2011). In North Carolina, rural customers shopped at small stores more often than urban customers (Pitts et al., 2013b). Small stores are perceived to have high prices, food of sometimes inferior quality, and less healthy choices (Scarpello et al., 2009; Yousefian et al., 2011). This thesis seeks to address the gap in the research examining the perspectives of customers on the role small rural food stores play in factors contributing to food choice and diet.

2.5. Environmental investigations in small rural food stores

There has been a recent increase in publications of studies focused on small stores in rural areas. In small stores in central Massachusetts, Olendzki et al. examined the availability of healthy and unhealthy foods longitudinally from 2007 to 2010 (2015). It was found that over half of the communities studied had either no food stores or a limited number of stores with little healthy food availability (Olendzki et al., 2015). Pereira et al., used the Nutrition Environment Measure Study in Stores (NEMS-S) to investigate stores in New Ulm, Minnesota (2014). The investigators found that convenience stores were less likely to stock fruits, vegetables, and other healthy foods than grocery stores (Pereira

et al., 2014). Pitts et al., used the revised NEMS-S in eastern North Carolina to compare food stores in rural versus urban corner stores (2013a). The investigators found that healthy foods had a lower availability and quality in rural stores compared to urban (Pitts et al., 2013a). In rural Texas along the Mexican border, Sharkey et al. explored product assortment in convenience stores (2012). It was found that the stores offered a larger assortment of less healthy foods and beverages (Sharkey et al., 2012). In American Indian communities in rural Washington State, O'Connell et al. found that a small percentage of convenience stores had fresh fruit available (2011). In the lower Mississippi delta region, including parts of Arkansas, Louisiana, and Mississippi, McGee et al. found limited availability of healthy foods in small grocery stores and convenience stores (2011). Liese et al. examined food store types and the cost and availability of foods in rural South Carolina (2007). The investigators found that supermarkets and grocery stores had a higher number of healthy foods than convenience stores (Liese et al., 2007). Additionally, where convenience stores sold some of the same products as supermarkets and grocery stores, the products a higher price point in convenience stores (Liese et al., 2007). Overall, studies agree that small stores generally have a small selection of healthy foods and those foods have a higher cost. This thesis seeks to address disparities in research on the relationship between the small rural food store environment and food purchasing and diet among a sample of customers in rural Maryland.

2.6 Healthy food interventions in small food stores

2.6.1 Interventions in urban food stores

Research examining the use of small stores to increase access to healthy foods in communities where supermarket availability is limited has been conducted in a variety of

settings, but the focus of the literature has been on corner stores in urban areas. In Baltimore, a corner store intervention showed an increase in stocking and sales of promoted healthy foods (Song et al., 2009). In New York City, a corner store intervention showed increases in the purchasing of promoted healthier foods (Dannefar et al., 2012). After intervention aiming to increase the availability of healthy foods in corner stores in Philadelphia, significant increases in the availability of fresh fruits were found (Cavanaugh et al., 2014). In Los Angeles, an intervention targeting corner store conversions changed the structure and aesthetics of the stores and provided robust technical assistance and training to store owners (Ortega et al., 2015). Although the intervention had a high level of community involvement, there were no improvements to store patronage, purchasing, or produce consumption (Ortega et al., 2016). Although a recent study in Latino small stores has been conducted in San Diego, only the methods paper for the intervention is currently available (Ayala et al., 2015). The results of interventions in urban areas show a positive impact on increasing healthy food availability and sales in communities with low access to healthy foods.

2.6.2 Interventions in rural food stores

Few interventions have been conducted in small rural food stores to increase the availability of healthy foods. In Pitt County, North Carolina, a pilot for the Centers for Disease Control's (CDC) Healthy Corner Store Initiative was conducted. As part of the project, the availability and affordability of healthy foods and beverages in small stores were increased in both rural and urban areas within the county (CDC, 2013). Only data from the formative research has been published; data from the intervention is not available (Pitts et al., 2013a; Pitts et al., 2013b). A second study in rural North Carolina

performed a 2-month intervention in Latino food stores (Baquero et al, 2014). A process evaluation indicated that the intervention had a high dose delivered, moderate dose received, and was delivered with good fidelity (Baquero et al., 2014). The intervention reported an increase in intake of fruit and vegetable consumption among customers of intervention stores (Ayala et al., 2013). The protocol for a planned intervention in rural Australia was published (Brimblecombe et al., 2013). The study uses a 20% price discount and in-store nutrition education to increase the purchasing of healthy items in rural stores (Brimblecombe et al., 2013).

2.6.3 Previous rural Healthy Stores interventions

Four previous Healthy Stores projects have been conducted in rural areas: Apache Healthy Stores, Marshall Islands Healthy Stores, Navajo Healthy Stores, and Zwiwaapenewin Akino'maagen: Teaching to Prevent Diabetes (ZATPD). The results of these studies and the methods used laid the groundwork for Maryland Healthy Stores-1, a pilot intervention in Charles County, Maryland, that preceded the study examined in this thesis, Maryland Healthy Stores-2. The following section provides a background on these five studies and how they laid the foundation for Maryland Healthy Stores-2.

Apache Healthy Stores. The Apache Healthy Stores intervention was conducted in White Mountain and San Carlos Apache reservations from 2003 to 2005 (Gittelsohn and Rowan, 2011). The primary activity of the project was in store promotion of healthy foods using tools such as cooking demonstrations and marketing materials (Curran et al., 2005). The project showed increases in food-related knowledge, healthy food intentions, and frequency of healthy food purchasing (Curran et al., 2005).

Marshall Island Healthy Stores. The Marshall Islands Healthy Stores was a pilot project conducted in nine small and two large stores (Gittelsohn et al., 2006). The intervention included cooking demonstrations, taste tests, and shelf labeling in-store as well as a media component to promote the purchase of healthy foods and cooking methods (Gittelsohn et al., 2007). The result was an increase in the purchasing of some promoted foods, healthiness in cooking methods, and knowledge of diabetes and label reading (Gittelsohn et al., 2007).

Navajo Healthy Stores. The Navajo Healthy Stores intervention was conducted in the Navajo Nation territory in New Mexico, Arizona, and Utah. Similar to previous studies, tools used in the intervention include cooking demonstrations, taste testing, educational displays, and shelf labels (Gittelsohn et al., 2013). Higher exposure to the intervention was found to be associated with reduced BMI, improved healthy food intentions, healthy cooking methods, and healthy food getting (Gittelsohn et al., 2013).

Zwiwaapenewin Akino'maagen: Teaching to Prevent Diabetes. The ZATPD trial was conducted in First Nations reserves in Canada and combined interventions in food stores and schools with activities at local health and social service agencies. The food store component was conducted with key messages focused on the purchase and consumption of foods lower in fat or sugar and higher in fiber (Ho et al., 2008). The program messages were transmitted through shelf labels, posters, flyers, cooking demonstrations and taste tests (Ho et al., 2008). It was found that respondents had significantly increased their food knowledge post-intervention (Ho et al., 2008).

Maryland Healthy Stores-1. The MHS-1 pilot study was conducted in Charles County, MD from April 2011 to March 2012. In this intervention there were eight small

stores that participated; four were randomized to the intervention and four were comparison stores (Anderson-Steeves et al., 2015). The four-month long intervention promoted 12 foods and beverages including fruits, vegetables, low-fat milks, low-fat cheese, whole wheat bread, etc. (Anderson-Steeves et al., 2015). Intervention strategies targeted increasing customer demand using tools such as in-store interactive sessions and increasing store supply using approaches such as subsidies for initial stocking of targeted foods (Anderson-Steeves et al., 2015). The study found that at 6 -month follow-up, intervention stores had increased stocking of fruits, vegetables, 1% milk, low-fat cheese, whole wheat bread, canned fruit, and cooking spray compared to baseline (Anderson-Steeves et al., 2015). In contrast, comparison stores had decreased stocking of fresh vegetables, low-fat cheese, and whole wheat bread (Anderson-Steeves et al., 2015). The study was successful in increasing the selection of healthier foods at intervention stores. The results of the Apache, Marshall Islands, and Navajo Healthy Stores and ZA are not widely generalizable to typical rural US communities as the studies were conducted in unique environments. Most of the locations where the interventions took place were relatively remote with much more limited access to food stores than a typical community in the rural US. The MHS-1 pilot study provided insight into the potential of introducing an intervention to rural Maryland, but, being a pilot study, only 4 stores were enrolled. The proposed study expands upon the work that was completed in the pilot study to provide an in-depth exploration of the role of healthy foods in small stores in rural Maryland. A unique aspect of the proposed study compared to previous Healthy Stores intervention is that it links the store level data with the customer level data via Aim 4. In comparison to other studies outside of the Healthy Stores interventions, the proposed

study adds a different voice to the qualitative literature as there is limited data available on the viewpoints of rural small storeowners and regular customers on healthy food selection within small stores.

2.7 Summary

Research has shown that the built food environment plays a key role in access to food. To reduce the risk of obesity and chronic disease in communities with low access to healthy foods, small food stores have been a target of investigations examining access to healthy foods in a variety of settings. Interventions seeking to increase access to healthy foods in underserved areas have shown a positive impact in stocking and sales of healthy foods in small stores. Previous studies conducted by this group in rural food stores have shown positive results in factors related to healthy food consumption, including healthy food purchasing, nutrition knowledge, and healthy cooking methods. A pilot intervention in rural Maryland showed an increase in the selection of healthy foods in small food stores. It is the purpose of this thesis to further investigate the use of small food stores in rural Maryland as a platform for increasing access to healthy foods.

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Chapter 3: Methods

This chapter describes the methods of the MHS-2 study specific to this dissertation including the qualitative and quantitative data collection and analysis for data collected from the store owners, customers, and the stores themselves.

3.1 Study Overview

The primary objective of this study was to investigate the food environment within small food stores in rural Maryland. The data collected to investigate the food environment was: 1) observational food store environmental assessment surveys of the product assortment within the small stores; 2) in-depth interviews (IDIs) with small store owners; 3) IDIs with small store customers; 4) surveys conducted with small store customers (**Table 3.1**). Additional data was collected during the study, including stocking surveys with small storeowners. However, those data are outside the foci of the aims, research questions, and hypotheses of this analysis. In this chapter, the study setting, data collection procedures specific to the data analyzed in this dissertation, and data analysis methods will be described.

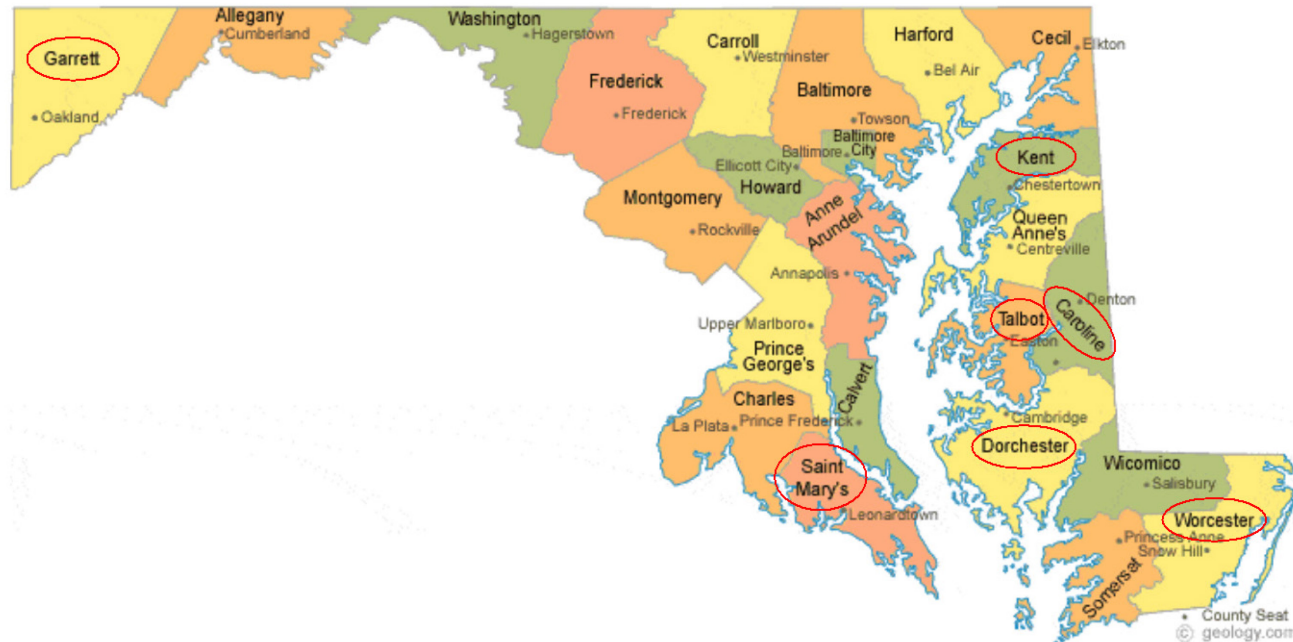
Previous studies examining the food environment in small stores have largely focused on urban settings (Ayala et al., 2012; Dannefur et al., 2012; Deweese et al., 2016; Gittelsohn et al., 2010). There is a paucity of literature available on the food environment in rural small stores. Therefore, the objective of the first phase of this study was to conduct a food store environmental assessment to investigate the product assortment within rural Maryland small stores. During the second phase of this study, interviews with small store owners and customers were conducted to explore factors surrounding the

supply and demand of healthy foods in small stores. In final phase of this study, surveys were conducted with small store customers to determine their store utilization habits and food purchasing history and to assess their fruit, vegetable, and dietary fat intakes.

3.2 Study Setting and Design

The study was set in small stores in seven rural Maryland counties selected for inclusion because they are the Maryland counties considered rural by the CDC (Ingram & Franco, 2012). The counties were Caroline, Dorchester, Garrett, Kent, St. Mary's, Talbot, and Worcester (see: **Figure 3.1**). For the purposes of selecting stores, a small food store was defined as a food store with less than 2,500 square feet of retail space. The majority of the data collection took place in the section of Maryland that is east of the Chesapeake Bay known as the Eastern Shore. Six of the counties, Caroline, Dorchester, Kent, Talbot, and Worcester, are located on the Eastern Shore. The Eastern Shore has an extensive coastline that is the centerpiece of the local tourism industry. Inland, there are extensive farmlands and concentrated animal feeding operations that produce chicken. Saint Mary's County is a peninsula on the western edge of the Chesapeake Bay that hosts tourism, contains farmland, and has a sizeable economic influence from the defense industry. Garrett County is the most western county in Maryland and is home to mountains and a large lake that are a year-round draw for tourism.

Figure 3.1 Map of Rural Maryland Study Counties



Cole B, no date (nd)

3.3 Data Collection

Data was collected in three phases detailed in the following sections. **Table 3.1** lists the total number of instruments conducted in each county. For the first phase, four data collectors (DD, JR, AT, CW) who had advanced training in nutrition and/or research methods collected the data for the food store environmental assessment. The second phase involved one data collector (DD) who had advanced training in nutrition and research methods and conducted the interviews. In the third phase, three data collectors (DD, MS, CW) conducted the surveys. All the data collectors were trained by the Principal Investigator on study-specific data collection methods before entering the field.

Table 3.1 Number of Observations for Each Data Collection Instrument by County				
Maryland County	Food Store Checklists	Interviews: Store Owners	Interviews: Customers	Customer Surveys
Caroline	3	4	5	49
Dorchester	5	0	0	45
Garrett	5	5	4	45
Kent	4	4	5	46
Saint Mary's	5	0	0	40
Talbot	7	0	0	45
Worcester	5	0	0	42
Total	34 ¹	13	14	312
¹ The total number of food store checklists in all retail food stores (large and small) was 248; a subset was used for this analysis (for details on the full data see: Campbell et al., under review).				

3.3.1 Phase One: Food Store Environmental Assessment

For the food store environmental assessment observational data was collected at food stores in all seven counties of the study. The intention of the food store assessment was to describe the food environment in retail food stores of all sizes throughout the

study area. A list of all licensed retail food outlets was provided by the county health departments for each of the seven counties. Between the fall of 2012 and the fall of 2013, four trained data collectors conducted food store environmental assessments using the study tool in 248 retail food stores in the seven study counties. The 248 retail food stores surveyed included both large and small stores and was previously analyzed (Campbell et al., under review). The total number of food store assessments included in this analysis was 34. For details on the selection of the subset, see section **3.5.3**.

The food store environmental assessment tool was used to describe the product assortment of foods and beverages in stores (see: **Appendix C**). The food store environmental assessment tool used in this study was a modified version of the Nutrition Environment Measures Survey in Stores (NEMS-S). The NEM-S is a comprehensive, observational tool that is used to assess the nutrition environment in stores (Glanz et al., 2007). The NEMS-S measures a variety of factors in the retail food environment including food availability, pricing, and shelf space. Items included on the NEMS-S include milks, fruits, vegetables, meats, frozen dinners, baked goods, beverages, and chips (Glanz et al., 2007). The food store environmental assessment tool used in this study is a modified and simplified instrument that evaluated the presence of 50 individual food items, store features such as aisles and cash registers, and prepared food options and has been used in previous assessments of the food environment (Gittelsohn et al., 2008). Data was collected for additional questions assessing tobacco that was not included in this analysis.

The data analyzed in this dissertation is a subset of the full food source assessment data and was used for the analysis for Aim 4 in Chapter 7. The subset of the

34 stores included in this study were those stores where customer surveys had been conducted. Further details are explained in section **3.5.3**.

3.3.2 Phase Two: In-Depth Interviews with Small Store Owners and Customers

For the second phase of the study, IDIs with small store owners and customers were conducted in three of the seven study counties from June through August of 2013. The qualitative data from interviews with store owners were analyzed for Aim 2 in Chapter 5 of this dissertation; the interviews with customers were analyzed for Aim 3 in Chapter 6. Interviews were conducted in three counties, (see: **Table 3.1**). The logistics and finances of the study limited the number of counties where IDIs could be conducted. Caroline and Kent counties were selected for qualitative data collection to represent the Eastern Shore of the state where the majority of the study counties were located. Garrett county was selected for data collection because it was the most geographically distant and distinct county in the sample. A convenience sample of stores was selected for the IDI data collection. Data collectors selected stores from the lists of small store provided by the county health departments. The data collectors visited the stores during business hours, spoke to the store owners to explain the study, and asked them if they would like to be interviewed.

At the start of the interviews, informed consent and permission to audio record the interviews were obtained from the participants (see: **Appendix G**). All interview respondents were 18 years old or older. Interviews with store owners were conducted in a quiet part of the store at the store owner's convenience. A trained interviewer employed by the Principal Investigator (PI) conducted the interviews. A semi-structured interview (SSI) guide that had been developed by the PI based on a priori research that had been

conducted in previous small store-based interventions (Gittelsohn et al., 2006; Gittelsohn et al., 2008). The SSI contained open-ended questions about the store background, how business is conducted, customer relations, and concepts related to healthy foods (see: **Appendix A**). The interviewer used probing to encourage participants to elaborate on their responses. Additional questions unrelated to this dissertation that pertain to tobacco appear in the SSI and were asked during interviews, but the data was not analyzed for this study. The interviews were 45 to 60 minutes in duration. Participants received \$20 gift cards upon completion of the interview.

To interview customers, the data collectors asked store owners who agreed to participate in the study for permission to conduct interviews with their customers. Store owners were asked to recommend regular customers (defined as a customer who visited the small store where data collection took place once a week or more) to be interviewed for the study. However, the frequency of visits per week to the store where data collection took place was not confirmed in the interviews. Once customers agreed to participate, informed consent and permission to audio record the interview was obtained in the same manner as the procedure for the store owner interviews (see: **Appendix H**). The customer participants were 18 years or older and were interviewed in a quiet part of the store. The trained interviewer conducted the interviews using an SSI guide for customers that was also developed by the PI based on a priori research in small stores (Gittelsohn et al., 2006; Gittelsohn et al., 2008). The SSI contained open-ended questions about food getting, nutrition knowledge, factors influencing food choices, healthy foods, and the small store (see: **Appendix B**). Although questions were asked about tobacco, the data did not pertain to this dissertation and are not included in the analysis. The

interviews were 45 to 60 minutes long and participants received a \$20 gift card upon completion of the interview.

3.3.3 Phase 3: Customer Surveys

In the third stage of data collection, surveys were conducted with customers of seven small stores in each of the seven study counties for a total of 49 stores. A convenience sampling method was used in this phase of data collection. The aim of data collection was to conduct seven surveys per store, but the number of surveys in some stores was limited by very low response rate, very low foot traffic, or both. The number of surveys conducted in each store ranged from 1 to 10, the median number of surveys collected in each store was 6. Three trained data collectors conducted data collection independently. In order to access customers of small stores, a list of small stores in each county that had been obtained from the county health department was randomized. The data collector would go to each of the small stores in the order they appeared on the randomized list and ask the store owner or manager's permission to conduct data collection with the store's customers. If the store owner agreed, the data collector would spend up to one work day in the store to conduct seven surveys. In some stores where the response rate and/or foot traffic was high, more than seven surveys were conducted in order to make up for the stores where obtaining seven completed surveys was not feasible due to financial constraints of the study budget. If the data collector had a good rapport with the store owner or manager, the store owner or manager would be asked to recommend or encourage regular customers to complete the survey. Otherwise, the data collector would ask every customer exiting the store that appeared to be 18 years old or older whether they wanted to complete a survey. Participants verbally assented that they

were at least 18 years old and then informed consent was conducted (see: **Appendix H**). The survey took approximately 30 minutes to complete and the participants were compensated with a \$20 gift card to a local retailer.

The customer survey collected data on demographics, self-reported anthropometrics, small store utilization and purchasing history at any retail store (not limited to small food stores) for a list of 32 foods and beverages (see: **Appendix G**). Questions about food-related psychosocial factors that were included in the survey were from three topic areas: food-related knowledge (six questions), food-related self-efficacy (four questions), and behavioral intentions on food-related behaviors (four questions). Additional data on tobacco-related knowledge was collected but not analyzed in this dissertation. In addition, two previously validated dietary intake screener were used to assess fruit and vegetable intake and the percentage of daily calories from fat. The All Day Fruit and Vegetable Intake Screener from the National Institutes of Health is a 10-item screener that asks about quantity and frequency of consumption of fruits and vegetables (Thompson et al., 2000) (see: **Appendix E**). Percentage Energy from Fat Screener from the National Cancer Institute assesses the percentage of a respondent's daily calories from fat by determining the frequency of consumption of 16 foods (Thompson et al., 2007) (see: **Appendix F**).

3.4 Data Management and Entry

Data collection forms with personal identifiers included the informed consents, food store environmental assessment forms (that had store names and addresses), customer surveys, dietary intake screeners, and receipts for the gift cards given as incentives to study participants were kept in a locked filing cabinet and were only

accessible by study staff. The audio files of the IDIs were transcribed by the author and another study team member into MS Word without identifiers and the original audio files were deleted. The MS Word transcriptions were then imported into Atlas.ti version 1.0 for Mac OS (Atlas.ti Scientific Software Development GmbH, 2016) for the textual analysis for Aims 2 and 3. The data from the food store environmental assessment forms was recorded in an MS Access file by a study team member, exported to MS Excel, and imported from MS Excel to Stata 11.0 (StataCorp LP, 2015). The data from the customer survey and fruit and vegetable and fat intake screeners was recorded by the author and another study team member into an MS Access file. The data from the MS Access file was exported to MS Excel and imported to Stata for the analysis for paper two. For the analysis for Aim 4, the Stata databases for the food store environmental assessment forms and the customer data were merged. There were 90 customers missing foods store environmental assessment data that were dropped from the analysis for a total of 222 customers included in the analysis. Similarly, stores that had food store environmental assessment data that was not matched to customer data was dropped. For quantitative variables, the distribution of values for each variable was checked. If outliers were found, they were checked against the data from the forms and revised if a data entry error was discovered. The significance level for the statistical analyses was $p < 0.05$.

3.5 Data Analysis

3.5.1 Aims 1 and 2

The qualitative analysis for Aims 2 and 3 used thematic analysis as the guiding framework. Thematic analysis is an inductive, exploratory method to analyze qualitative data that uses a content-driven approach to create themes that aid in answering research

questions (Guest et al., 2012). According to Braun and Clarke, “Thematic analysis is a method for identifying, analyzing, and reporting patterns (themes) within data. It minimally organizes and describes your dataset in (rich) detail” (2006). Unlike other analytic approaches, thematic analysis is a flexible method that is not tethered to a particular theoretical paradigm (Braun and Clarke, 2006).

The analysis followed a six-phase plan of analysis as outlined by Braun and Clarke (2006). The first phase involved becoming immersed in the data by reading and rereading the transcripts while noting initial ideas for codes. In the second phase, the initial codes were generated and applied to the data; 21 codes were created for the customer interviews and 23 for the interviews with store owners (for codebook, see: Appendix J). In the third phase, the codes and relevant data were sorted into preliminary themes. For the fourth phase, the themes were reviewed and refined. Themes that had sufficient supporting data were retained; those without were discarded. Some themes were merged and others broken down and new themes emerged in this phase. The fifth stage consisted of defining and naming themes. Each theme was analyzed to examine how that theme contributed to the understanding of the data. The final, sixth phase is when the report or, in this case, Chapters 5 and 6 of the dissertation, were produced.

3.5.2 Aim 3

For this aim, an exploratory data analysis (EDA) was conducted to examine the quantitative data collected in the customer surveys, the distribution of the variables, and the outliers. The means and standard deviations were examined for continuous variables and the proportion of the distributions were examined for categorical variables. For the variables related to food purchasing frequency and dietary intakes, the means and

standard deviations for participants were examined based on their frequency of visiting any small store in the previous 30 days. Four groups were defined for the frequency of visiting any small store in the previous 30 days: ≤ 4 visits; 5-8 visits; 9-20 visits; and ≥ 21 visits. The Kruskal-Wallis test was used to test for differences in food purchasing and dietary intakes by the four groups of the frequency of visiting any small store in the previous 30 days. The Kruskal-Wallis test was used because the distribution of the variables was non-normally distributed and it is a non-parametric version of the One-way Analysis of Variance. The null hypothesis is that the samples are from identical population distributions. The more conservative p-value without ties (a p-value that is not adjusted for ties in the data) was used.

3.5.3 Aim 4

For the investigation of Aim 4, the food store environmental assessment data was combined with the customer survey data for analysis. The customer survey data was collected exclusively in small food stores. Therefore, a subset of the total number of food store environmental assessments was analyzed in Chapter 7. Customer survey data was collected at a total of 49 food stores in February through June of 2014 (see the proceeding section on phase three for further details on customer survey data collection). Due to a discrepancy between the store lists used in the 2012-13 versus 2014 data collection, food store environmental assessment data was not collected in all of the stores where customer survey data was collected. A total of 34 food store environmental assessments were included in this study; **Table 3.1** illustrates the breakdown of assessments conducted by county.

For the models used to examine the hypotheses in Aim 4, the control variables were sex, age, education, and employment. To facilitate analysis and interpretation of the models, continuous variables that were not normally distributed were categorized, and ordinal and nominal categorical variables were dichotomized. The ages of the participants in the sample were not normally distributed and had a mean of 48.1 years with a standard deviation of 16.2. Because the variable was not normally distributed and to facilitate interpretation of the model, age was categorized into the following age groups: 18-29 years, 30-39, 40-49, 50-59, and 60 and over. Education was dichotomized into high school education and below or education beyond high school. Employment was dichotomized into currently employed or retired versus currently unemployed or on disability.

In the analysis for hypothesis 4A, two models were used. For the first, the dependent variable was the frequency of sugar-sweetened beverages (SSB) in the previous 30 days. A Poisson model was attempted, but the conditional variance exceeded the conditional mean, indicating over-dispersion and violating the assumption of the Poisson distribution where the mean and the variance are equaled (Hilbe, 2007). Therefore, the following negative binomial regression model was used:

$$\mu=[E(Y)]=\exp[\beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+\beta_5X_5+\beta_6X_6]$$

Where $E(Y)$ was the expected frequency of SSB purchases in the previous 30 days. In this model, the availability of low-calorie beverages in store (X_1) was the main independent variable of interest. This variable was binary variable where 0 indicated that 1 to 3 varieties of low-calorie beverages (bottled water, diet iced tea, diet soda, or low-sugar flavored water) were stocked and 1 indicated that 4 varieties were stocked. This

dichotomization was designed because ~10% of stores stocked one to two varieties of low-calorie beverages, ~28% stocked three varieties, and ~62% stocked all four varieties. This distribution of observations, where the number of observations for stores stocking one to two varieties of low-sugar beverages was small can lead to small p-values and a wide confidence interval for the coefficient. Therefore, the dichotomization was used. The number of store visits in the previous 30 days (X_2), was categorized for ease of interpretation at one to four times (indicating an average of once a week or less), five to eight, nine to 20, and more than 20; a dummy variable was used to compare the categories. The variable X_3 was a binary variable for sex where 0 equaled male sex. The variable X_4 was age categories, as explained previously, as a dummy variable. The level of education, X_5 , was a binary variable where 0 represented that the highest level of education completed was high school/GED or below versus beyond high school/GED for 1. Finally, employment status (X_6) was a binary variable where unemployed or on disability was 0 and employed or retired was 1. The variables X_2 - X_6 were a priori confounding variables that were used in all the models in this analysis.

The second model was also a count model where the conditional variance exceeded the conditional mean and a negative binomial regression model was used. The dependent variable was and high sugar and fat content snack purchasing in the previous 30 days and was summed from the purchasing frequencies of the following three food categories from the customer survey: (1) chips (including potato chips, Doritos, tortilla chips, cheese curls); (2) cookies, cake, or Danish (i.e. Honey bun, Tastycake); and (3) candy (i.e. candy bars, chocolates, Skittles, gummy bears). The independent variable of interest was healthy snack availability, the following eight items were summed from the

food source checklist: baked chips, graham crackers, low-fat popcorn, low sodium crackers, low sugar pudding packs, low sugar/low fat granola bars, nuts, pretzels, and trail mix (without chocolate). The number of healthy snacks stocked at the stores was a categorical variable with the potential values of 0-8. The smallest number of healthy foods stocked at any store included in the analysis was 2, therefore the actual number of healthy snacks stocked in the sample of stores was 2-8. Because the smallest number of healthy snacks stocked was 2, a categorical variable was created where 1 was two healthy snacks and 2, 3, and 4 were three, four, and five snacks stocked, respectively, to facilitate interpretation of the model. The value 5 was given to stores with six or more snacks stocked because the number of observations of customers of stores included in the dataset where six or more snacks were stocked was low. There were three stores with 6 healthy snacks stocked and they had a combined total of 17 customers included in the analysis. There were three stores with 7 healthy snacks stocked and they had a combined total of 11 customers included in the analysis. Similarly, there was one store with 8 healthy snacks stocked that had 8 customers included in this analysis. The confounders were the same as in the previous model.

In the analysis for hypothesis 4B the relationships between healthy food availability in small store visits and fruit and vegetable intake and dietary fat were analyzed. The fruit and vegetable intake was estimated based on data from the fruit and vegetable screener using established methods (Applied Research, 2013a; Thompson et al., 2000), as was the percent of daily calories from fat from the fat screener (Applied Research, 2013b; Thompson et al., 2007). Respondents with a fruit and vegetable intake

of 13 servings per day or more were considered extreme values, and 12 respondents with extreme values were excluded from analyses.

To examine the relationship between the food store environment and fruit and vegetable intake, the number of varieties of fresh fruits and the number of varieties of fresh vegetables observed at each food store were categorized as per their categories on the data collection instrument and used as the independent variables of interest. For fresh vegetables, 0 indicated that no fresh vegetables were stocked in the store; 1 was one to two varieties stocked; 2 was three to five varieties; 3 was six to ten; and 4 was 11 or more. A categorical variable for the number of varieties of fresh fruits stocked was created in the same manner as that for vegetables; there were no stores that stocked 11 or more fruit varieties. A multiple linear regression (MLR) model was used where fruit and vegetable intake was the dependent variable and the a priori confounding variables were included. However, the MLR did not conform to assumptions of the technique.

Therefore, a variable was created that facilitated interpretation of the results of the analysis, the daily recommended total intake of fruits and vegetables was determined for each participant using the 2015 Dietary Guidelines for Americans (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2015). Using the age of each participant, the recommended daily servings of fruits and vegetables was determined for a sedentary individual. The fruit and vegetable intake estimate for the screener was then divided by the recommended daily servings to create a dependent variable that is the percentage of the recommended daily servings of fruit and vegetables consumed by participants. The median reported percentage of the recommended daily servings of fruit and vegetables consumed by participants was 51.5%. In order to create a count variable,

the percentage of the recommended daily servings of fruit and vegetables consumed by participants was then multiplied by 100 and rounded to the nearest integer. A count model was used to model the relationship between the variables; this model was a negative binomial regression because of over-dispersion. The a priori control variables of the previous models were included in this model.

For the relationship between the food environment in small stores and dietary fat intake in customers, the overall healthy food availability was determined from the food source checklist for the predictor variable. Details on the scoring of the food source checklist are available (Campbell et al., under review). Briefly, a summative score of the checklist, called the Healthy Food Availability Index (HFAI), was created to quantify the overall availability of healthy foods in the stores. The HFAI had a range of 0 to 31 possible points with a higher score indicating a greater availability of healthy foods. The HFAI scores were categorized into quintiles for analysis to facilitate interpretation. The dependent variable, the percentage of daily calories from fat, was dichotomized where 0 indicated 35% or less, or, a healthy fat intake. Although the reported percentage of calories from fat was a continuous variable, a binary variable is more informative than a continuous variable. The rationale behind the binary variable is that the recommended intake of the percent of calories from fat is 35% or less. A reported intake of 24% is not considered a better marker of a healthy fat intake than 25% or even 34%. Therefore a dichotomous variable was created where the value 1 indicated a fat intake above the recommended limit of 35% of daily energy; 77.7% of participants had a reported fat intake of <35% of total daily calories. A binary logistic regression model was used to

examine the relationship between the HFAI score and a priori confounders on the odds of consuming >35% of total daily energy from fat:

$$\ln[\text{Pr}[Y]/(1 - \text{Pr}[Y])] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6$$

Where $\text{Pr}[Y]$ was the probability of consuming 35% or more of daily calories from fat, X_1 is the quintiled HFAI score, and X_2 - X_6 were the variables for small store visits, sex, age, level of education, and current employment, respectively.

3.6 Funding and Ethical Approval

This study was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board and funding was provided by a Community Transformation Grant from the Centers of Disease Control and Prevention.

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Chapter 4. Results: Aim 1

A Qualitative Analysis Customer Perspectives of Healthy Foods and Small Stores in Rural Maryland

4.1 Introduction

To understand the potential utilization of small rural Maryland food stores as a venue to increase access to healthy foods, it is important to examine customer perspectives on healthy foods and purchasing. To explore the views of rural Maryland small store customers on healthy foods and the role of healthy foods in small stores, in-depth interviews were conducted with 14 participants at small stores in three rural Maryland counties. The participants were adults (18 years and older) and although the investigators targeted regular store customers (customers who used the small store where data collection took place once a week or more), the number of times per week that they used the small store where data collection took place was not confirmed in the interview. To reflect the heterogeneous nature of small rural Maryland food stores, the participant sample included customers from convenience stores (stand-alone and attached to gas stations), liquor stores, delis, and small, independent grocers. Using an in-depth interview guide, the interviewer explored how participants obtained food, influences on purchasing decisions, healthy food access, and ways to help other community members to purchase healthy foods. A thematic analysis was conducted (details on the analysis are found in section 3.5.2) to address the following aim and research questions:

Aim 1: To understand the perspectives and behaviors related to food purchasing of small store customers in rural Maryland.

Research question 1A: What food sources are used by rural Maryland small store customers?

Research question 1B: How do knowledge and information about nutrition influence food purchasing?

Research question 1C: What are the facilitators and barriers to healthy food purchasing?

Research question 1D: How can rural Maryland small store customers be encouraged to purchase healthy foods?

4.2 Results

4.2.1 Food Sources

Participants mentioned a variety of food sources including both large and small stores. When asked about where they obtain food, Walmart was the most popular chain store and was mentioned by 13 of the 14 participants. One participant mentioned another box store, Target. Supermarket chains were also noted by 13 participants. The most popular chain, Fresh and Green, was mentioned by four participants. Shortly after data collection, Fresh and Green ceased operating in Maryland as it was cited as unprofitable by its holding company (Sherman, 2013). Other chains noted by participants included Acme and Food Lion, each mentioned by three participants. Only eight of the participants, who were all small store customers, named small stores as food sources. Three participants named farmer's markets and three mentioned home gardens. Other food sources named by one participant each were a food cooperative, the Dollar General dollar store, the Amish market, and an Air Force Base in a neighboring state. Full-service

restaurants, local establishments and chains, were mentioned by 10 participants and six participants named fast-food chains including McDonald's, Dairy Queen, and Domino's.

Participants shopped at small food stores much more frequently than at large stores. Seven participants said they shopped at large stores every one to two weeks; only two participants shopped at large stores multiple times per week. Nine participants said they shopped at small stores more than once a week, among those, five participants stated they shopped at small stores three times per week or more. The most popular foods purchased at small stores were prepared foods, alcohol, beverages, candy, and meat. In comparison, the most common foods bought at large stores were fruit, candy, meat, milk, and eggs.

4.2.2 Nutrition Knowledge and Food Purchasing Decisions

To explore the level of nutrition knowledge and its relationship to food purchasing decisions, participants were asked about their knowledge of sodium and fats. Participants generally understood sodium to have a negative effect on health. As one participant said, "You're always hearing that you shouldn't eat so much salt, you know, because there's salt in everything. Potato chips, your bread, things you don't even realize there's salt in" (Caucasian male, approximate age: 40s-50s). Nine participants identified a relationship between salt or sodium consumption and blood pressure. Five participants noted that they checked for sodium levels in foods, however, most of those respondents either checked only sometimes or did not specify how often they checked; only one participant specified checking for sodium most of the time. When asked about foods that have a high sodium content, participants named processed and/or restaurant foods. Chips, frozen foods, and soups were cited as being processed foods high in sodium. Participants

said that “mostly canned items, not fresh” and “packaged, mostly prepackaged foods” were high in sodium. On restaurant food, one participant said, “When I was at the restaurant last night they used a lot of teriyaki sauce, like Chinese foods I think have a lot of sodium” (Caucasian female, approximately 19 years old).

Participants described their knowledge of fat and how it affects their food purchasing decisions. Participants described their knowledge of fat in vague terms, “I know there’s good fats, I think cheese, not cheese, maybe fish, as opposed to fats that are in maybe beef” (Caucasian male, middle aged [40s-50s]). Another participant responded, “I know it slows you down, like it, I don’t know, like more nutritious foods give you more energy and make you function better. Like fat slows you down and affects your body in a bad way” (Caucasian female, ~19 years old). Several respondents associated fat with weight gain and one said, “It’ll make you gain weight” (African-American [AA] female, 40s). Most respondents were not concerned with the fat content in foods, as one said, “I don’t know, I’m not a very healthy person when it comes to eating anything” (Caucasian male, 50s).

4.2.3 Health and Nutrition Information and Food Purchasing Decisions

For some participants, health and/or nutritional characteristics were factors in purchasing foods. A participant who was weight conscious described purchasing decisions and calories, “I go with what I think is lower calorie. I do buy, I don’t buy potato chips, but I do buy these cracker chips. Special K, I think it’s Special K brand cracker chips which are, it says 120 calories for [a serving]...I watch my calories as much as I can” (Caucasian female, 70s). Another participant said that “labels, calories, all that stuff” impacted food purchasing decisions. One participant explained how health

information would influence purchasing decisions, “If I got more [health or nutrition] information about stuff it would affect [purchasing] a lot...if I knew more about stuff like that it would encourage me” (Caucasian female, ~19). On the other hand, for a few of the other participants, health and/or nutrition information did not play a role in food purchasing decisions. One participant expressed how health and nutrition information could play a factor in their purchasing choices, “I would think that if I paid attention to it, it would make a big difference because I wouldn’t want to be putting, you know, unhealthy things into my body...and with two kids, I really do need to be more, you know, health conscious, but I’m just not [laughs]” (Caucasian female, mid-30s).

Price played a large role in food purchasing decisions for a minority of respondents. As one respondent commented,

“There’s a health food store in town, and then I buy almond butter from them but every time I went back it was like two or three dollars more expensive, so you know. It just got pretty expensive there. But I don’t know, I look for price and try to look at quality. But price is a pretty big factor these days with the cost of things” (Caucasian male, 40s-50s).

One participant described how price affected her choice of food store,

“I’d rather be able to get everything from Wal-Mart all the time, or some like Food Lion or Acme, but Save a Lot is very cheap, which is why I tend to shop there...it’s more convenience [at the small store], but the prices aren’t bad [at the small store]” (Caucasian female, mid-30s).

Another participant expressed how a strong desire for a product might lead to a willingness to reduce purchasing of other products, “I’ll pay more for my multigrain ciabatta rolls than...I mean if I want something bad enough, I’ll buy it but I’ll probably do without a bunch of other stuff so that I can have what I want” (Caucasian female, 40s-

50s). For another participant, quality and price were equally influential, “[It has to be] a good product and a good price” (AA female, 40s).

Taste was cited as the most important factor for one respondent, “It’s more the taste than anything... It’s not a price” (Caucasian male, 50s).

4.2.4 Foods Perceived as Healthy

Participants were asked what foods they thought of when they thought about healthy foods. The most common foods named were vegetables and fruits. Salads were a commonly named prepared food. Animal source proteins were also commonly mentioned including chicken, fish, yogurt, eggs, and lean meats. Other foods mentioned included Jello, juices, milk, tofu, turkey, and water.

4.2.5 Facilitators and Barriers to Healthy Food Purchasing

Participants were asked to describe facilitators and barriers to healthy food purchasing. When asked what makes it easier to access healthy foods, none of the respondents named a direct facilitator to purchasing healthy food. For one respondent, facilitating factors were not as important to purchasing healthy foods as personal drive, “I think that it’s a personal decision that, you know, if you want to do it, you’re gonna do it. You can’t just wait for somebody to bring it to you” (female, 50s, ethnicity unknown). Another participant stated that it would be easier to obtain healthy foods, “If they put less junk food in the stores to look at and buy [*laughs*]” (AA female, 40s).

Participants described availability, time, knowledge, the desire to consume less healthy foods, and seasonality as barriers to purchasing healthy foods (**Figure 4.1**). In terms of healthy food availability, one participant drew a parallel between supermarket access and healthy food access, “You know, accessibility. If we had a [regional

supermarket chain] nearby, that would be great. The closest one's over in Annapolis and who wants to drive over the bay bridge just to go to [regional supermarket chain]" (Caucasian male, 40s-50s). As one respondent said, "I just don't put the time and effort into it. I work at night you know what I mean? And I have two daughters, and it just, I don't really have time to sit down and plan out, you know? It's just, it's more of a time issue for me" (Caucasian female, mid-30s). Knowledge was cited by another participant as a barrier, "I think it's harder because I don't really know what to look for, and then I guess it would [be] easier if I had the knowledge" (Caucasian female, ~19). The desire to choose less healthy foods was a barrier noted by other participants. As one participant said, "When you see all the junk food that's like right there [*laughs*]" (AA female, 40s). Another participant said, "Of course, with my granddaughter there I bought a bag of candy and that's what's um, I've got to get back off" (Caucasian female, 70s). Seasonality for local produce was mentioned as a challenge, "During the winter there's no local fresh produce to really be bought at farmer's markets, it's brought in just like everybody else's. So, it's, I think it's a challenge" (Caucasian female, 40s-50s).

Figure 4.1 Barriers to Accessing Healthy Foods

Barriers	Key Quote
Availability	“A deli or something like that doesn’t always have healthy choices”
Time	“I don’t really have time”
Knowledge	“I don’t really know what to look for”
Desire to consume unhealthy foods	“When you see all the junk food”
Seasonality	“There’s challenges in winter”

4.2.6 Food Purchasing at Small Stores

In describing the kinds of healthy foods that they would like small stores to stock, participants said they would like additional prepared foods and produce. For prepared foods, participants named salads and wraps. One participant said that they would like to see the small store have a deli counter. Many participants said that they would like small stores to carry fruits and vegetables. One participant described the kinds of vegetables they would like to see stocked, “Anything local, I mean, any corn, squash, cucumbers, turnips, beets, green beans, lima beans” (Caucasian female, 40s-50s).

When asked about foods they would not purchase at small stores, participants were concerned about expiration dates, freshness, and safety. Participants expressed a lack of trust in the foods for sale at small stores. One participant questioned the freshness of foods at small stores, saying “You have to check the dates all the time” (female, 60s-

70s, ethnicity unknown). Foods that participants stated they would not buy at small stores were largely highly perishable items such as dairy products, meats, produce, and seafood. As one participant remarked, “I probably wouldn’t buy, like, I don’t buy a lot of like sour cream and things like that, things with dates on it in small stores because sometimes they don’t check the expiration dates, things like that” (Caucasian female, mid-30s). Another participant said that he would not purchase produce at a small store because, “I don’t know how much they would go through or how long it’s been there” (Caucasian male, 40s-50s). The inventory turnover at larger stores made products there more appealing,

“Normally, I wouldn’t buy the cereal, um, because, like some of these [small stores], I’m afraid they’re outdated too, you know. And then the boxes, just by looking at the boxes sometimes lying there...I think whenever comparing prices again, if it’s about as the same as a bigger store, which I know moves a lot more than what a small store would, you know, why I’m just liable to get it there instead of at the small store” (Caucasian female, 60s-70s).

Product safety was a concern for one participant who said they would not buy, “Things that have like recalled past recalls and you’re a little worried that you might get something that might be tainted or have salmonella or something like that” (Caucasian female, 40s-50s). The participant had an issue with a small store purchase in the past, and recounted,

“I have been in a smaller store where I actually have purchased something, I’ll give you an example, a can of tomato soup, and I went to dump it out and it came out looking like cranberry sauce already froze, I mean it was like and then I looked at the date and it had expired already like 2 months before and I’m like ok so.”

4.2.7 Buying New Products at Small Stores

We explored what would make respondents more likely to purchase new products at rural Maryland small stores, and most respondents were open to purchasing new products. Advertising and word of mouth recommendations were noted by several respondents as significant factors influencing the purchasing of new products at small stores. For one respondent, television advertising was particularly influential, “I’d probably see it on television and then say I’d seen it in the store and buy it. Something, you know. Then if I didn’t like it, I wouldn’t buy it again of course” (Caucasian male, 50s). For word of mouth, one respondent remarked she would be more likely to try a product, “Because of hearing somebody else tell me, ‘Hey, that was good. I get it at this place,’ you know” (Caucasian female, 60s-70s). Personal opinion from a trusted source was more important than messages from mass media,

“Somebody else who has experience [with] the product [would make me likely to try it], you know, somebody that I would trust as far as their opinion goes. So probably like, you know, a friend or acquaintance or something like that versus mass media because I don’t necessarily believe mass media all the time” (Female, 50s, ethnicity unknown).

Some participants expressed an interest in trying new products. As one participant said, “Something new, I would try anything actually if it appealed to my sense of taste” (Female, 60s-70s, ethnicity unknown). Another participant remarked, “Well sometimes if [the store owner] gets when you know, they’ll get new stuff in I’ll try, I’ll try something” (Caucasian female, 70s). In-store taste tests were a draw to participants, particularly those who were more open to trying novel products.

“I probably would just [try it] because it would be different and I like to try new things. Also, like, sometimes [I go to a store where] they have tastings like they’ll have um their new jams or whatever that you

can try with Ritz crackers or they'll have this like beer bread or something and you could use their dips. So when it's available to you to be able to taste it or see something cooked in a different way in a different spice or something like that then that usually gets me to buy" (Caucasian female, 40s-50s).

One participant who would only purchase new products after tasting stated, "I wouldn't buy it unless I tried it first" (Caucasian male, late 20s-early 30s).

4.2.8 Ways to Promote Healthy Food Sales in Small Stores

Informants had several ideas for encouraging community members to purchase healthy foods in small stores, centering around taste tests, in-store advertising and displays, and educational outreach (**Figure 4.2**). Taste tests were a very popular idea, and participants noted that it was a tool used in other stores including Walmart. As one participant noted, "I think free samples. I mean even [another local store] was giving out free samples on cereals and stuff like that. You know, the consumer loves anything free" (Female, 50s-60s, ethnicity unknown). Another participant suggested that free samples would be a useful tool to reach participants who associated healthy foods with poor taste,

"Free samples is a good idea, I think. Because I think if you would you know, if they would promote the product and let people try it, then that would maybe... you know, then and see if it tastes good even though it's healthy and maybe they would, you know, have a better chance of buying it. Because I think a lot of people associate healthy food with it tasting like crap because it's good for you" (Caucasian female, mid-30s).

For in-store advertising and displays, one participant suggested posting signage highlighting the health benefits of promoted products, "They'll have tomatoes [with the price on] this square that's sitting right next to it. You know, they could put, you know, rich in vitamin blah, blah, blah or you know, lowers cholesterol or any type of benefit" (Caucasian female, 40s-50s). In educational outreach, a participant recalled an educational display at a dentist's office that was impactful,

“My dentist had a thing in his office that showed a, I guess it was a twenty-ounce bottle. It showed the bottom of the bottle, that’s how much sugar is in each can of soda...He says that really helps parents look at that. Really, there’s that much sugar in there? Just to let people realize how much is in everything, you know. Just telling them like the percentage isn’t enough. More physical or visual” (Caucasian male, 40s-50s).

Figure 4.2 Promoting Healthy Foods in Small Stores

Suggested Method	Key Quote
Taste tests	“Free samples to try”
In-store advertising	“They could put...any type of [health] benefit”
Displays	“A sign by the product”
Educational outreach	“[A class on] healthy eating and snacks you could fix”

4.3 Summary

In this qualitative exploration of the perspectives of rural Maryland small store customers, informants tended to shop more frequently at small stores versus large stores, although the proportion of their food acquired at each food source is not known. In discussing their knowledge of nutrition, related to sodium and fat, participants were able to name some key nutritional messages, although sometimes only vaguely. Most participants named fruits and vegetables as healthy foods and said they would like to see

produce sold at small stores. However, participants expressed concerns over the freshness of foods, particularly fruits and vegetables, at small stores. While some participants considered health and/or nutritional information in food purchasing decisions, price was a major factor. Participants said that advertising and word of mouth were the major ways that they were prompted to try new products. In-store taste tests were suggested as a way to encourage community members to buy healthy foods.

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Chapter 5. Results: Aim 2

A Qualitative Exploration of Store Owner Perspectives of Healthy Foods in Their Businesses

5.1 Introduction

Exploring how rural small store owners conceptualize healthy foods and the potential for incorporating healthy foods into their business is critical to engaging store owners in healthy food interventions. Thirteen small store owners were interviewed by a trained interviewer on food stocking and sales, the operation of their businesses, and the role of healthy foods in stores. Thematic analysis was used to analyze the interview transcripts (details on the analysis are found in section 3.5.2) to answer the following aim and research questions:

Aim 2: To understand the perspectives of rural Maryland small store owners on healthy foods and their behaviors related to food sales.

Research Question 2A: How do small store owners in rural Maryland perceive their customer base and popular products?

Research Question 2B: How do small rural store owners set prices?

Research Question 2C: What is the experience of store owners in terms of merchandising and promotion?

Research Question 2D: What are store owners' perceptions of healthy foods and the role the foods play in their businesses?

5.2 Results

5.2.1 Participant and Their Stores

A variety of store types were included in this study. Of the 13 stores sampled, four were gas stations, three were liquor/convenience stores, two were small, independent grocery stores, one was a deli/convenience store, one was a discount grocery store, one was a marina store, and one was a natural foods store. The customer base varied depending on the store and location. Almost half of the store owners said that they were a community store with a heavy local customer base. Nearly half of the store owners said had a seasonal fluctuation in their customers; most of the store owners with a seasonal fluctuation had a large segment of their seasonal business specifically from the boating community. Two of the stores were located next to the off ramps of major highways, and the store owners said that many of their customers came from highway traffic. One store owner maintained a large selection of Mexican foods and relied on a largely Latino customer base.

5.2.2 Popular Products at the Stores

According to the 13 store owners interviewed, the most popular items sold at the stores were sugar-sweetened beverages, chips, alcohol, bread, juice, and breakfast cereal. Among sugar- and alcohol-free beverages, water and milk were cited as popular by two store owners. Fruits and vegetables were only specified as popular by two store owners. Snacks of note included beef jerky, granola bars, Greek yogurt, nuts, and trail mixes. Desserts that were noted include ice cream, candy, and snack cakes. Among store owners who sold prepared food, cold sandwiches were the most frequently mentioned popular item, followed by hot sandwiches. After sandwiches, fried chicken was the most

frequently mentioned prepared meal item. One store owner said that salads were a popular item at the store.

5.2.3 Sources of Products Stocked in the Stores

Store owners generally had two sources of foods and non-alcoholic beverages sold at their stores: (1) wholesale distributors for general groceries and ingredients for prepared foods; and (2) vendors that represented specific product lines. There was a mixed of regional and national wholesale distributors that store owners used. Vendors of specific product lines were generally national companies for bottled beverages and shelf-stable foods. The companies cited by store owners included major soda manufacturers, chip and salted packaged snack companies, snack cake makers, and bread companies. Three regional vendors were used for dairy and ice cream. Store owners also use wholesale clubs and discount stores as sources of a minority of their products or when they needed to source products between deliveries.

Deliveries to the stores generally occurred between once and twice a week by the majority of vendors. With wholesale distributors, store owners had a variety of methods of maintaining stock records and ordering. Some store owners kept records and comparison shopped for price differences between distributors. Other store owners relied on the lists provided by the distributor of what the store had been stocking to conduct inventory and ordering. Orders were usually placed by phone and some distributors had salesmen that would regularly visit the store. In deciding which distributor to use, store owners had different preferences depending on the product. For packaged foods, store owners could price comparison shop across distributors because the products were a standard good. For perishables or ingredients for prepared foods, store owners were

concerned about price, quality, and preparation time. One store owner explained how he chose to source his lettuce,

"We have Wagner and Sysco because we are able to jump between the two...Like Sysco has romaine lettuce and theirs is always pre-washed and its plasticized and then boxed so it's protected. Where Wagner's is not always washed, we have to cut it up and wash it here which takes more time, costs us more money. So we know to go to Sysco for our romaine lettuce" (Caucasian female, 30s).

For product lines represented by national vendors, the representatives from the vendor would control the inventory and stocking of the product displays independently. As one store owner said, "Frito Lay, they do their own products. We have Herr's potato chips. They do their own. Utz does their own. If something doesn't sell, they do take back the out of date products" (Caucasian female, 30s).

5.2.4 Product Pricing at Small Rural Stores

For pricing, the percentage markup varied widely between stores and products. Some products, particularly packaged goods supplied by specific vendors, had prices printed on the units. For items priced by the store owner, the range of markups for packaged goods and beverages was between 10% and 50%. Prepared food had a markup that ranged between 40% and 50%. The determination of the percentage markup varied across participants. For packaged products, some store owners used the wholesalers' suggested pricing. "We usually use what [the wholesaler] gives us, their suggested retail [price]" (Caucasian female, 50s-60s). Some store owners took competition into account and used the pricing at other small stores in the area as a gauge against which to set prices. The owner of a small, independent grocery store used a wholesaler who provided different categories of suggested pricing and always picked the lowest price because "It's more competitive that way" (Caucasian female, 60s). A nearby convenience store used

the same wholesaler and would pick the highest markup price. The grocer felt that their pricing had to be more competitive because their customers were seeking lower prices instead of convenience. The store owner said, "I sell my Pepsi two liters at a dollar forty-nine, he sells them for a dollar eighty-nine because he is at a convenience store and [the customer is] either going to buy it or going to leave it. And he does that with most everything he has out there...My candy bars are ninety-nine cents, his is a dollar sixty-nine" (Caucasian female, 60s). There were additional factors calculated into the cost of prepared foods than to the cost of packaged foods, including the cost of labor and ingredients. For prepared foods, some of the perishable ingredients can be subject to price fluctuations such as seasonal changes in the price of produce. One store owner described the careful price planning that occurs:

"We have a profit margin that my husband has set in place for all items in the store. So we actually have our little cheat sheets that we create on Excel spreadsheets and him and I sit down. We type in all the pricing and then we plug in our numbers and then we get our per pound for the meat, per pound for the salads, you know the tuna salad, pasta salad, etc. The sliced cheese, and it's all done in ounces and we have it down to a science back there for the deli staff. How many slices go on a small sub, how many slices go on a large, on a sandwich" (Caucasian female, 30s).

Not all store owners tracked the price inputs of their prepared foods as thoroughly. In one instance, a store owner that did not keep rigorous records of their pricing for prepared foods described discovering how the store was losing money on their products:

"We've held our prices down for years; four and a half years and we've not moved our price. We've actually discovered that a lot of the stuff we were selling like the shrimp or wings, which, by the way, are not deep-fried, we were selling them for less than we were paying so we had to do some adjusting" (Male, 40s-50s, ethnicity unknown).

5.2.5 Impact of Store Competition

Several store owners felt they did not have direct competition by virtue of their remote location. As one store owner whose store was on a country road with low traffic said, "Competition with other stores? It largely doesn't affect us" (Caucasian female, 40s). Another store owner said that his store was the only store stocking groceries in the area, "Actually, I don't have that kind of competition over here. Other stores, they got just like beer, liquor, wine, and we [carry the] same product[s] over here...and grocery-wise, [close] to me, I don't see any store [carrying the same products]" (South Asian male, 50s). A third store owner said, "I don't experience much competition because we are the only store that's within really in our local area" (Caucasian female, 60s).

Among store owners who expressed that they perceived that they had competition from other stores, the competition affected store owners in several ways. Several store owners said that local competition influenced pricing. Store owners said they tried to provide "fair pricing" or to avoid having a "fight with the price" while acknowledging that lower prices at nearby stores impacts their business. One store owner described a difficult situation with a competitor:

"[The competitor] normally tries to undercut us on price no matter what we do. So we don't really, we try to, don't really let anything that his store does influence us, how we buy, or how we price things because we know what kind of profit margin we have to make. We just kind of do our own thing go by that" (Caucasian female, 40s-50s).

Competition also influenced stocking. Store owners stocked particular foods to attract or retain customers. The owner of a small store with a deli said:

"We really were about the only convenience store around for many, many years and then just slowly [the competition] started coming. Then we just try to figure out a new way to add things. That's why we added the hot food. That's why we added the ice cream. We just try to do

things a little different to make people still, you know, we want the customers still to come here” (Caucasian female, mid-30s).

One store owner had a strategy focused on new products:

"If a vendor wants to come in and you know wants us to set up a new product we try to encourage them into not going to the other stores in this county. Let us try it out here first and see how it goes and if it does well then we can always buy more because we'll be selling more and they'll be coming to our store to buy it” (Caucasian female, 30s).

5.2.6 Merchandising in Small Rural Stores

The merchandising, or display of products in the store, is an aspect of sales that stimulates customers to buy products. Store owners interviewed described two ways of merchandising: (1) they chose their own product placement, (2) the vendors of specific product lines dictated product placement as part of their contract with the store. In deciding their own product placement, store owners had different systems depending on the type of product. The front and back of the store were key strategic positions. The front of the store was a central location that was near the register and was generally understood to be a high-traffic area. Owners would place goods they wanted to highlight or draw attention to at the front of the store. One store used a display at the front of the store to promote items that the owners wanted to sell immediately. "That little table up front...beside the checkout. [We] keep things there that, that we kind of like to move out and...grab their attention" (Caucasian female, 40s). The store owners would display items that had price promotions or seasonal products at the table. Another store owner had a similar method of displaying seasonal items and would keep outdoor grilling supplies, such as fire starting nuggets or charcoal briquettes, inside the front door. "That stuff obviously comes at a certain time of year you get it at a better price. So you put it out front more" (Caucasian female, 50s).

Items that were placed at the back of the store were core food items that, it was thought, customers would come into the store specifically seeking. Items such as bread, milk, and soda were placed at the back of the store so that customers would have to walk through the store to access the products. About milk, a convenience store owner said, "Milk is necessary to them and they walk around for milk and bread and I want to show to them" (Asian male, 60s). Influencing the store traffic pattern so that customers had to walk to the back to access core foods items was a way of marketing the other products in the store. Customer flow through the store would expose them to the merchandising of other products. As a store owner remarked, "Of course someone told me to put your sodas and bread in the back so you have to pass by everything" (Caucasian female, 50s).

Vendors that dictated where specific product lines were placed often had merchandising terms as part of their contract with the store. Incentives are often offered to store owners for the merchandising terms. Vendors that sell refrigerated products would offer coolers to store owners to display their products with restrictions that only the vendor's product could be stored in their proprietary cooler. "Pepsi has their shelving, and Coca-Cola has theirs, and of course our ice cream companies have their coolers out there, and they like their space. But if I crowd them a little bit sometimes they never say too much" said one convenience store owner (Caucasian female, 60s). Packaged snack vendors would supply displays or shelving to merchandise their products. In some cases, monetary incentives were provided in exchange for placement at key locations in the stores:

"I know the vendors like Frito, like the chip companies, Lance, they like to be near the register. They want to be in an area where it's convenient so that's really, I don't want to say they argue, but they really try to get in first. So, you know, they tell [the other store owner],

'Oh. Can we have the space?' I know Hershey's if we put in a rack, they'll pay us so much money to put in you know an extra candy rack, but really they just really want to be near the where the traffic is" (Caucasian female, mid-30s).

5.2.7 Relationships with Customers

The majority of store owners expressed that they had a positive relationship with their customers. Rapport building with regular customers was viewed as an important aspect of customer relations. Store owners frequently viewed relationship building with their customers through the lens of friendship.

"I think we have a friendly interaction with our customers. We are a, most of our customers we know, because it's the same people over and over again. Even the transients are people that we come to know and maybe we don't remember their name, but we remember their face, so they are the same. But it's a friendly relationship" (Caucasian female, 50s-60s).

The owner of a deli who had a background in sales saw his customer relationships regarding furthering store sales. He believed that individuals enjoy buying products from people they viewed as their "friend" and kept that in mind when relationship-building with customers. "I'll come out of my office and see someone eating, and I always walk by—How's the food, folks? Is it good? Is it enjoyable? I would like to think that I win them over and they'll buy more from us" (Male, 50s-60s, ethnicity unknown). However, few store owners expressed confidence in their ability to leverage their customer relationships into increased revenue. The co-owner of a liquor store was not confident in their sales abilities but said that the other store owner, "Can upsell a bottle of wine in a heartbeat and the customer will be coming back for more" (Caucasian female, 30s). The owner of a liquor store/deli expressed a feeling of not being able to impact what the customer buys, "I would say we really don't have any influence on what they want except maybe quantity" (Caucasian male, 50s-60s). Other store owners expressed an idea that

stocking, product assortment, and price were of primary importance and sufficient to maintain their customer base.

5.2.8 In-Store Marketing and Promotions

In-store marketing was focused on two areas: signage and product promotions. Stores that contained deli sections used both boards promoting deli products and prepared foods and menus for prepared foods to inform customers of their products. For packaged goods, signage was provided and maintained by either the store owner or vendors. Some store owners expressed a desire for additional in-store marketing materials such as shelf-toppers and signage. Available space was seen as a barrier to signage.

Price promotions included offering a low, introductory price for new products and combination meal specials. The owner of a small, independent grocery store used a periodic in-store contest as a promotion; the prize was a bag of groceries or a holiday basket. Free samples, particularly of prepared foods, was used as a way to promote products. A store owner with hot prepared foods said, "We've prepared wings, we've prepared rotisserie wings precooked...I gave them away free for a day. See if that move...yes, it moved" (Caucasian male, 50s-60s). Three store owners said they did not do any promotions in their stores.

5.2.9 Marketing in the Local Community

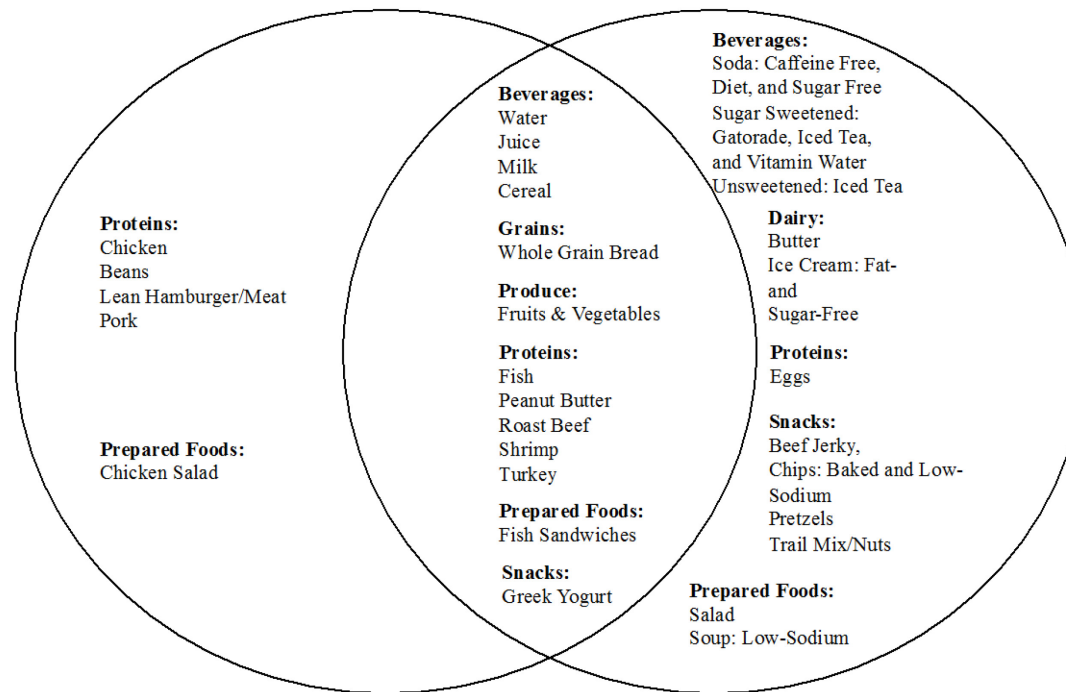
Store owners reported a variety of ways they engaged in marketing their stores and products to the community, with mixed success. One store owner promoted the store in the community via the local school sports teams and churches, "We always try to help with the kids at schools. That, I do, I do try to follow through with all three schools and that keeps me, and the churches, that they all buy from us for all their events" (Caucasian

female, 60s). A marina owner whose clients received a monthly bill for recurring expenses included a newsletter with the bill that included product promotions for the store. Some store owners advertised online through their own websites. One store owner had current lunch specials on the store website, "We have a website which has our daily lunch specials on it. I change them every week, so they can just get on there and look at our lunch specials." Advertising in the media, print and radio, was utilized, but cited as very expensive. One store owner said that ads on the local radio could cost about \$500, "We advertise on the radio once in a while whenever there's something going on in town...but it's too expensive to do too much radio." Another store owner said they had "very little success with newspapers" and would like to do more advertising, but didn't know where to put ads.

5.2.10 Healthy Foods: Conceptualization and Stocking

Store owners described their concept of what foods they considered to be "healthy foods" and "healthy foods stocked" in their stores. There were significantly more foods cited as "healthy foods stocked" in stores than foods that were described as "healthy foods" (**Figure 7.1**). Few processed foods were described as healthy, but many processed foods like salty snacks and ice cream were listed as healthy foods stocked. For example, store owners did not describe artificially-sweetened or sugar-sweetened beverages as healthy foods, but they did list them as healthy foods stocked. The largest single group of items listed for either category was protein foods; a much wider range of protein foods were listed as healthy than as healthy foods stocked.

Figure 5.1 Healthy Foods: Storeowner Concept and Stocking



Items listed as "Healthy Foods"

Items listed as "Healthy Foods Stocked"

5.2.11 Perceptions of Customer Nutrition Concern and Knowledge

Store owners perceived their customers as generally having low levels of concern or knowledge about nutrition, particularly their low-income customers. The owner of a gas station convenience store described what his customers thought about sodium levels in their food, "Over here, just like my location, it's low-income people. They don't care, so anyone mention, actually, I don't know about that stuff" (South Asian male, 50s). The owner of small store that had both high- and low-income customers thought that the high-income customers were more concerned about trans fats than the low-income customers, "I think our [high-income] customers probably are concerned about [trans fats] and I think our other customers could care less" (Caucasian female, 50s-60s). Store owners generally did not perceive the influence that their product assortment had on customer buying habits in terms of healthy and unhealthy foods. The owner of a small store with a deli counter described her experiences with taking sandwich orders:

"Usually when they're coming in here to buy a sub or really any I mean we've got a lot of people who you can tell are looking to control their diet. But when they come into [store name] our, just for an example, our small sub is seven ounces of meat. So I don't know if they're really looking to watch what they're intaking when they come in. And you know, I, people ask for extra mayonnaise and personally I cringe because I know what that stuff is and I know what it does to your body and it's just not good. Eating processed meat is one thing. Taking in mayonnaise on top of that is just don't do it, [laughs]" (Caucasian female, 30s).

Another store owner described low levels of perceived customer concern over trans fats while acknowledging that the store's product assortment tended towards unhealthy foods, "By some of the things that they buy in here, I would say 75% don't care or the fact that they're not educated" (Caucasian male, 50s-60s).

5.2.12 Challenges to Stocking Healthy Foods in Small Rural Food Stores

The principal challenges to stocking healthy foods were perceived low sales, lack of cold space for storing perishable foods, and access to wholesale products. When describing the perceived low sales of healthy foods, store owners expressed concern that they would not be able to sell healthy foods fast enough to prevent losing stocks through spoilage. The owner of a liquor store said, "Probably the biggest challenge is keeping [healthy foods] in date and getting it sold before it you know rots or spoils or goes out of date" (Caucasian female, 50s). A major unspoken implication was that healthy foods were highly perishable; shelf-stable healthy foods were not mentioned when discussing barriers to stocking healthy foods. One store owner described an unsuccessful attempt at stocking fresh fruit, "We have tried to stock fruits, and the challenge is that particularly since we are not air conditioned, the shelf life is very short. So they don't last and, quite frankly, people don't tend to buy them" (Caucasian female, 50s-60s).

Some store owners characterized their customer base as having low interest in purchasing healthy foods and did not think that sales would be adequate to substantiate stocking healthy foods. Two store owners said that the way they could overcome challenges to low sales of healthy foods was to bring in new or more customers. Other store owners saw their customers as ready to purchase healthy foods at the store if the foods were offered at a low enough price. One store owner who said that there had never been a problem with consumer demand for healthy foods described how low pricing of healthy foods would help draw customers, "If you can beat out the grocery store when it comes to, you know, a few apples or bananas you know, they'll get them here along with

their bread, milk, and eggs. So you know, that would definitely win the customer over" (Caucasian female, 30s).

Lack of cold space for storage and/or display of healthy perishable foods was cited as a barrier and one store owner described considering the purchase of a reach-in refrigerator to display healthy foods in the store:

"We've talked as far as having the cold space we've talked about maybe a reach in. A small one would probably work here...Something you would see in, the Wawa's has quite a large one, but you, the customer can reach in and grab, it's open, they hold the fresh fruit you know it's packaged, priced already, ready to be scanned. Yogurts, you know sliced cheese. Things like that that you can just kind of grab and snack in addition to you know a healthy sandwich and your water or whatever. So something like that would really work" (Caucasian female, 30s).

Supply of wholesale products was a challenge to stocking healthy foods. The owner of a small, discount food store described the challenge of finding stock at the right price point:

"[Healthy foods are] not readily available through the discount stores...If we could find a supplier who would have it readily available at a decent price... Because a discount store like this, people come in and they expect lower prices. I mean, when they come in, they just expect to find lower prices. And when you can't match that, then, it tends to sit...If we could find a supplier that has it for reasonable prices and everything, why I think that would be a huge asset" (Caucasian female, 40s).

The owner of a remote small store recounted the difficulties encountered with trying to source whole wheat bread in quantities appropriate for the store.

"When we deal with their distributor the only thing that kind of bothers us there is the quantity there. If you buy a case of whole wheat Kaiser rolls, which come in frozen, already prepared, there might be 72 of them in a case. You really can't get that small quantity to allow you to try something new when you don't have the space and you're not sure if it's going to move" (Caucasian male, 50s-60s).

5.2.13 Stocking New Products

Store owners described several factors that interested them when they considered stocking new products: price, quantity, and wholesaler promotion/advertisement. Lower introductory prices for new products encouraged store owners to try the products in their store. One store owner said the savings were passed onto the consumer to encourage them to buy the product, "Sometimes, price-wise, [the wholesalers] keep low-price for few weeks and then they go up...And so that's the way like new product. Customer when they see price is cheaper, then customers, they buy" (South Asian male, 50s). Similar to low pricing, lower minimum quantities helped store owners try new products. A small grocer said:

"If I have to buy 500 of something I won't try it because I'll have it next year at this time. But if it's packed where 24 or 36 that's always a gamble. You know you can handle 36 of something, but if its 500 or 144 of something, we're just small. Our traffic area's the same people and you have to and they'll try it one time, but will they come back five times and try it?" (Caucasian female, 60s).

Wholesaler promotions and advertisements facilitated store owners' purchasing of new wholesale products. The salesmen from the wholesale companies that had relationships with the store owners could promote items that would be beneficial to the store. A store owner with a deli counter described how the sales representative suggested a tomato that better suited the needs of the deli:

"Since we've had the deli for 14 years and the same salesman for 12 years, he kind of knows my trends and you know his mind. If something comes up, just like this year with tomatoes. Tomatoes was outrageous in price so he suggested a salsa tomato. Well it looks exactly like a regular tomato...and it's half the price and it's better. Because, not better than a home grown, because it's a better, meatier tomato. And so those kind of things they can steer you too. They don't want to get you too low in price because they're working off commission you know" (Caucasian male, 50s-60s).

Commercial food shows were an event promoted by wholesales to expose business owners to new products. One store owner described the experience of going to a commercial food show:

"During the food shows you can get food show pricing and they encourage you to pre order. So that way you get that pricing for so many months. So that does help out...They give you these food show dollars where you get to go around and spend and they have games where you get to win dollars to go towards your account. So there's benefits for the owners to go to these shows because you can win money to go towards your accounts and purchase these new items...or current items that you already use so it's nice" (Caucasian female, 30s).

5.3 Summary

This qualitative investigation of the perspectives of rural Maryland small store owners sought to understand how the rural small store operate from the point of view of the store owners themselves and examines how store owners feel about the current and potential role of healthy foods in their business. The results of our study indicate that owners of small food stores in rural Maryland view the role that healthy foods play in their businesses through the lens of perishability and inventory turnover. When listing the foods they considered healthy, store owners focused on less processed, more perishable foods. In contrast, many of the foods cited as healthy foods stocked in their stores were more highly processed, shelf-stable foods with fewer health-promoting properties. Spoilage and the accompanying loss of inventory was a key concern for store owners and was related to the perception that the market for healthy foods could not support adequate sales. Within the store, there was competition for product placement and vendors often controlled the stocking of popular items. Store owners had differing levels of confidence

in two key business skills: product pricing and sales. The customer base varied across stores and this reflected in the differing degrees of community engagement.

Chapter 6. Results: Aim 3

A Descriptive Analysis of Small Store Customers in Rural Maryland

6.1 Introduction

Little is known about the demographics, small store usage patterns, and purchasing habits of small store customers in rural Maryland. To investigate the frequency of small store utilization, food purchasing, and surrounding factors, a quantitative survey was conducted with regular small store customers 18 years of age and older in seven rural counties (see: **Appendix G**). For the purposes of selecting small stores where data collection took place, a small store was defined as a food store with less than 2,500 square feet of retail space. The questions for the survey were taken from a previously developed and tested survey (Anderson-Steeves et al., 2015).

The survey contained questions about small store purchasing behaviors including reasons for shopping at the small store, visit frequency to the store where data collection took place and other small stores, and usual purchases of food and non-food products. For frequency of purchasing of select non-prepared foods at any store in the past 30 days, items on the survey included dairy products, non-alcoholic beverages, fruits and vegetables, beans, snacks, condiments, and cooking fats. The survey contained questions about food-related psychosocial factors including food-related knowledge (six questions), food-related self-efficacy (four questions), and behavioral intentions on food-related behaviors (four questions). To obtain estimates for fruit and vegetable intake, the previously validated All Day Fruit and Vegetable Screener was used (Thompson et al., 2000) (see: **Appendix H**). For the estimate of dietary fat intake, the previously validated

Percentage Energy from Fat Screener from the National Cancer Institute was used (Thompson et al., 2007) (see: **Appendix I**). The following aim and research questions are addressed in this analysis of the survey data:

Aim 3: To explore factors surrounding food choices among small store customers in rural Maryland.

Research Question 3A: What are the small store utilization motives and habits of regular rural small food store customers in Maryland?

Research Question 3B: What are the customer food purchasing and dietary habits?

Research Question 3C: To examine food-related psychosocial characteristics including nutrition knowledge, food-related self-efficacy, and behavioral intentions.

6.2 Methods

Surveys were conducted in the seven counties in Maryland considered rural by the CDC (Ingram & Franco, 2012): Caroline, Dorchester, Garrett, Kent, St. Mary's, Talbot, and Worcester counties at seven stores in each county for a total of 49 stores. There were 40-49 participants per county. A convenience sample of participants 18 years of age and older were recruited to participate. A median of 6 customer surveys (range: 1-10) were conducted per store, with a total of 312 participants. Participant recruitment is detailed in Chapter 3 (see: **3.3.3 Phase 3: Customer Surveys**).

The analysis of Aim 1 is detailed in section **3.5.1**. Briefly, an exploratory data analysis was conducted for this aim. The means and standard deviations were examined for continuous variables and the proportion of the distributions were examined for

categorical variables. For the variables related to food purchasing frequency and dietary intakes, the means and standard deviations for participants were examined based on their frequency of visiting any small store in the previous 30 days which was categorized into 4 groups: ≤ 4 visits; 5-8 visits; 9-20 visits; and ≥ 21 visits. The Kruskal-Wallis test was used to test for differences at the $p < 0.05$ level.

6.3 Results

6.3.1 Small Stores Sampled

To reflect the heterogeneous nature of rural small food stores, a variety of small stores were sampled. To classify the types of small stores sampled, the North American Industry Classification System (NAICS) was used (**Table 6.1**). The NAICS is a classification system used by federal agencies, including the Census Bureau, to classify businesses for statistical data purposes. The NAICS codes obtained were the primary code listed in Reference USA (Reference USA, 2016). The NAICS codes were available for 46 stores; three stores did not have codes listed in Reference USA. The standard definitions, presented in **Appendix J**, reflect the heterogeneity of the small food stores sampled. While some stores that were included in the study, such as those classified as “Convenience Stores,” “Other Gas Stations,” and “Other Grocery and Related Product Merchants” contain food sales in their NAICS code definitions, other stores such as those classified as “Beer, Wine, and Liquor Stores,” “Marinas,” or “Sporting and Recreational Goods/Suppliers” did not. However, all stores included in the sample were small stores that were sources of food and non-alcoholic beverages.

Table 6.1 Store Types Sampled in the Study			
NAICS Code Description	Stores n (%)	Number of Participants Interviewed n (%)	NAICS Code
No Code Available	3 (6.12)	22 (7.05)	n/a
Beer, Wine, and Liquor Stores	3 (6.12)	19 (6.09)	445310
Convenience Stores	15 (30.61)	93 (29.81)	445120
Food (Health) Supplement Stores	1 (2.04)	7 (2.24)	446191
Limited-Service Restaurants	4 (8.16)	28 (8.97)	722513
Marinas	1 (2.04)	3 (0.96)	713930
Meat Markets	1 (2.04)	5 (1.60)	445210
Other Gasoline Stations	8 (16.33)	58 (18.59)	447190
Other Grocery and Related Products Merchants	1 (2.04)	8 (2.56)	424490
Pharmacies and Drug Stores	1 (2.04)	3 (0.96)	446110
Sporting and Recreational Goods/Suppliers	1 (2.04)	6 (1.92)	423910
Supermarkets/Other Grocery (Excluding Convenience Stores)	10 (20.41)	60 (19.23)	445110
Total	49 (100.00)	312 (100.00)	

6.3.2 Participant Demographics

The distribution of sex in the sample included slightly more women than men, with just over half of participants being female (**Table 6.2**). Participants were older; almost half of the participants were 50 years old or older. The most common level of attained education was high school or a GED, followed by some college. Approximately 65% of participants were employed at the time of data collection; the majority of those working were employed at a full-time position. Less than a quarter of participants were unemployed or collecting disability.

Table 6.2 Demographics of Small Food Store Customers in Rural Maryland	
Category	n (%)
Sex¹	
Women	169 (56.2)
Men	143 (45.8)
Age² mean (standard deviation [SD])	47.5 (16.1)
18-29 years	45 (16.5)
30-39 years	60 (19.4)
40-49 years	58 (18.7)
50-59 years	72 (23.2)
60 and over	75 (26.2)
Level of Education Attained³	
8th Grade or Less	24 (7.7)
High School/GED	138 (46.4)
Technical/Vocational Training	5 (1.6)
Some College	71 (22.8)
Associate's Degree	24 (7.7)
Bachelor's Degree	30 (9.7)
Graduate School	19 (6.1)
Employment Status^{3, 4}	
Employed Full Time	136 (43.7)
Employed Part Time	57 (18.3)
Seasonal or Temporary Employment	9 (2.9)
Retired	36 (11.6)
Unemployed	62 (19.9)
Disability	11 (3.5)
¹ n=312; ² n=310; ³ n=311; ⁴ Percentages do not sum to 100 due to rounding.	

Most participants reported that their number one reason for shopping at the small store where data collection occurred because the location was convenient to their home or workplace, or was accessible by public transportation (see: **Table 6.3**). Participants who selected “Other Reason” were able to provide a qualitative answer. Seven of the participants responded that they shopped at the store because they or someone they knew

worked there. Other reasons included “good owners,” “pleasant atmosphere,” and “sell food I like.”

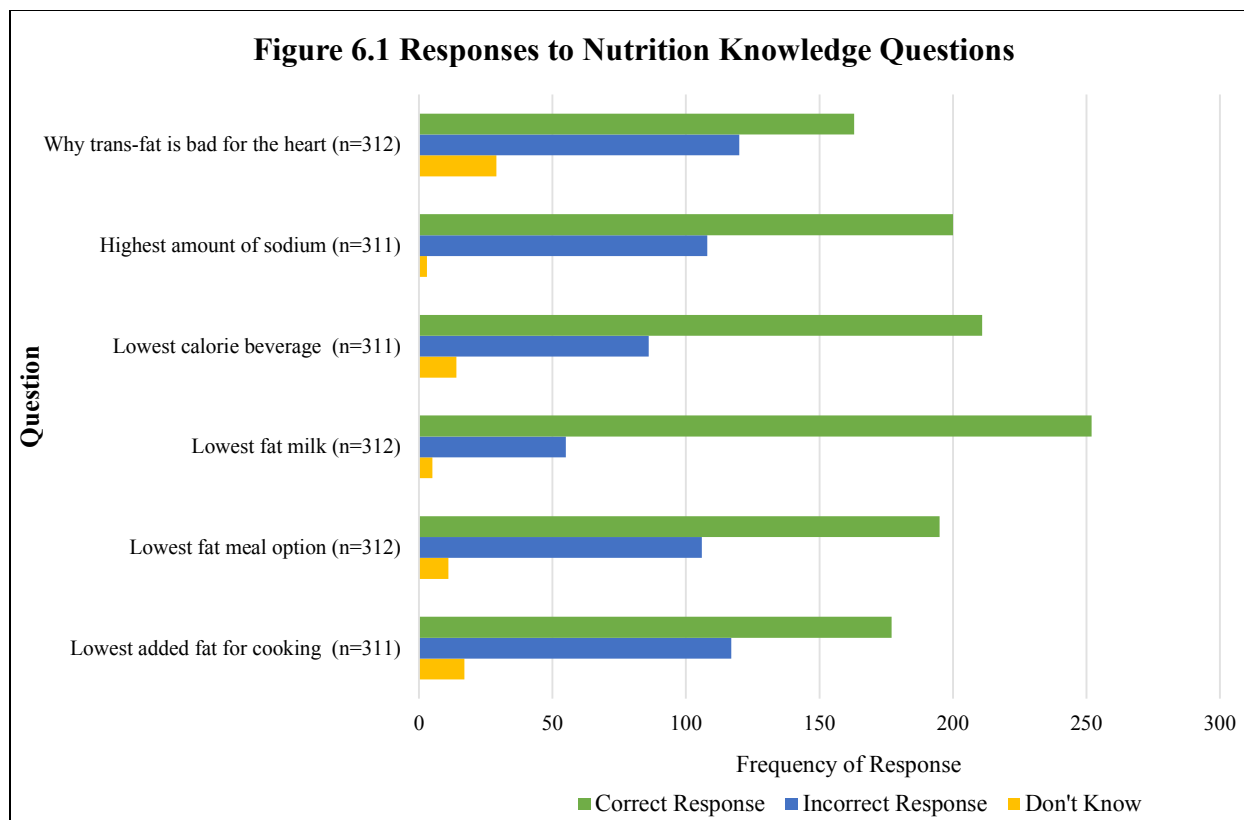
Table 6.3 Reason for Shopping at this Small Store	
Reason	Participants [n (%)]
Convenience (Close to home/workplace, accessible by public transportation)	127 (41.6)
Good service	63 (20.7)
Better quality of foods	37 (12.1)
Taste of foods	28 (9.2)
Lower cost	20 (6.6)
Cleanliness	17 (5.6)
Other Reason	13 (6.3)
Total	305 (100.1)*
*Percentages do not sum to 100 due to rounding.	

Utilization of the small stores among participants surveyed was frequent. The mean (SD) number of visits to the store where the data collection took place was, at 15.9 (16.1) visits in the previous 30 days, more than three times per week. In comparison, the mean (SD) number of visits to all other small stores combined in the previous 30 days was, at 7.0 (9.8), less than twice a week. Overall, participants visited any small store most days of the month with a mean (SD) of 22.8 (19.2) visits in the previous 30 days.

6.3.3 Food-Related Psychosocial Variables

The majority of participants were able to answer the nutrition knowledge questions, which included questions about fats, sodium, and calories, correctly (**Figure 6.1**). For food related self-efficacy, the majority of participants thought that it would be “very easy” to implement the healthier food practices presented (**Figure 6.2**). In behavioral intentions, the majority of participants said they would for the lowest added fat for cooking eggs and to drink water for their next beverage (**Figure 6.3**). However,

the majority of participants also said they would choose a higher fat milk and a higher fat snack for their next milk and snacks purchases, respectively.



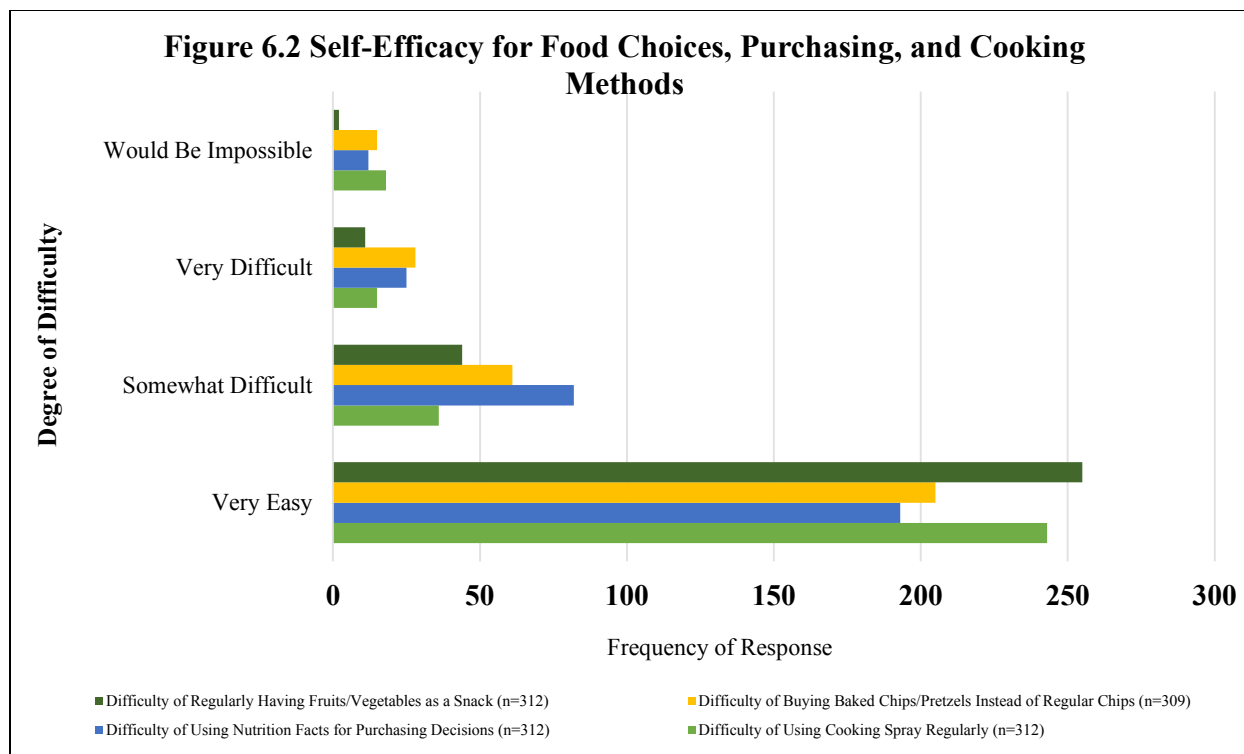
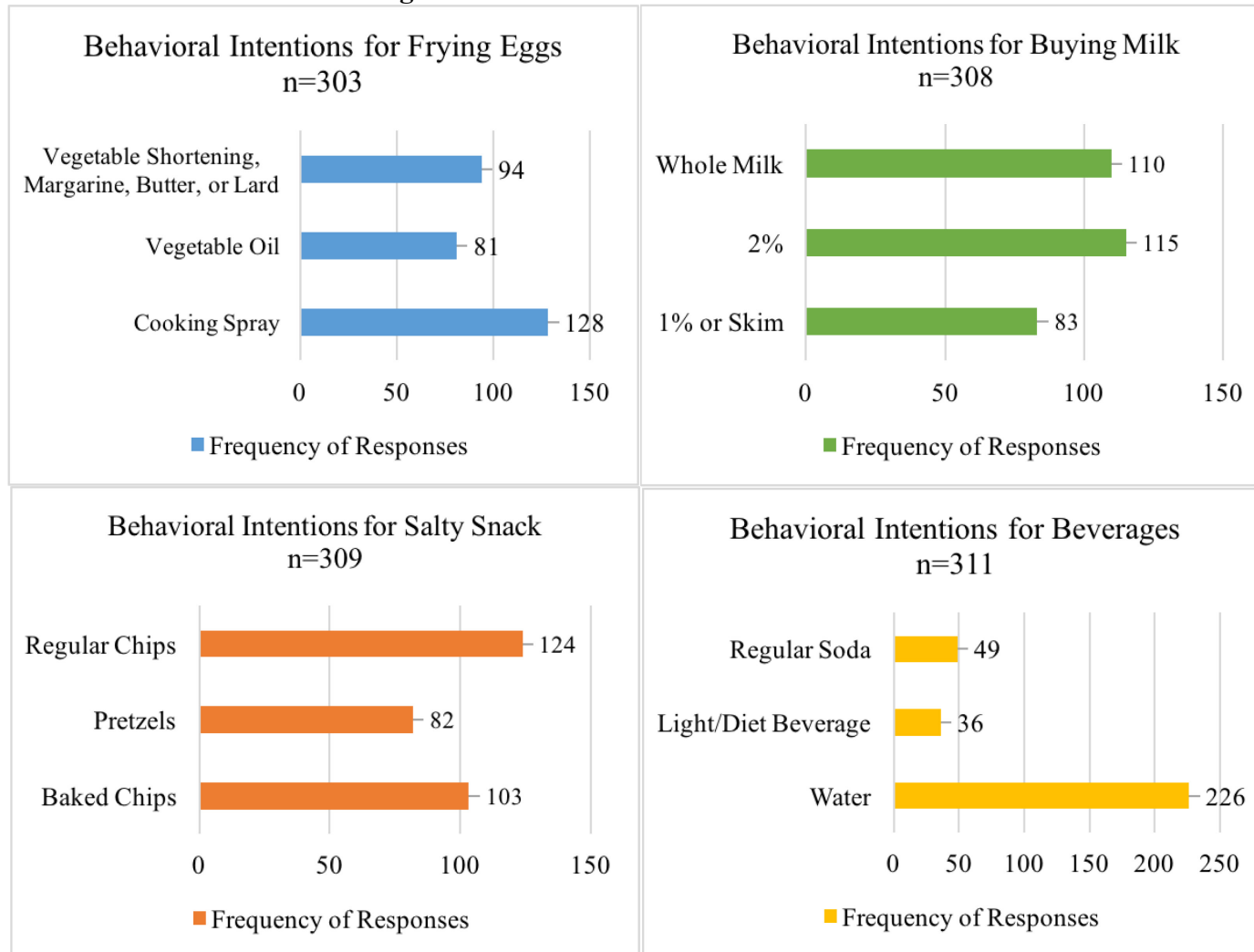


Figure 6.3 Behavioral Intentions for Cooking Methods and Food Choices



6.3.4 Food Purchasing Frequency

The mean number of beverages purchased in the previous 30 days was highest for sugar-sweetened beverages (regular soda or energy drinks and fruit drinks) and bottled water (**Table 6.4**). Regarding the purchasing of fruits, vegetables, and beans, fresh fruits and vegetables were purchased with the greatest frequency (**Table 6.5**). Among snacks, chips, and cookies, cake, or Danish pastries had the highest frequency of purchasing (**Table 6. 6**). In cooking fats and condiments, butter, margarine, or shortening and oils were the most frequently purchased (**Table 6.7**). Statistically significant differences were found in the distributions of the frequency of purchasing of the following variables when categorized by store visit: fruit drink; regular soda and energy drink; canned fruit in juice; canned beans: baked, with pork, or added salt; chips; cookie, cake, or Danish pastry; and candy.

Table 6.4 Purchasing Frequency: Beverages Purchasing in the previous 30 days by store visits in the previous 30 days, n=312 Mean (SD)					
	All Store Visits	≤4 Visits n=33	5-8 Visits n=53	9-20 Visits n=80	≥21 Visits n=146
Dairy					
Reduced Fat Milk (2%)	1.60 (3.42)	1.15 (2.06)	1.75 (3.56)	1.49 (2.52)	1.71 (6.00)
Whole Milk	1.59 (2.67)	1.18 (2.42)	1.28 (2.23)	1.36 (2.33)	1.91 (3.01)
Low Fat Milk (1% or Skim)	0.80 (2.00) ²	0.94 (2.15)	1.62 (3.28) ⁵	0.75 (1.70)	0.51 (1.35)
Low-Calorie Beverages					
Bottled Water	5.23 (8.24) ³	0.38 (0.87) ⁴	0.66 (1.45)	1.29 (6.11) ⁶	1.11 (3.98)
Diet Soda or Energy Drinks	2.11 (5.68)	1.39 (2.12)	1.15 (2.76)	2.25 (6.14)	2.54 (6.66)
Sugar Free Drinks or Mixes	1.00 (3.49) ²	2.45 (5.66)	2.11 (2.53)	2.81 (3.97)	3.74 (6.97) ⁷
Sugar-Sweetened Beverages					
Fruit Drinks ¹	6.74 (7.88)	2.18 (5.51)	1.68 (2.27)	3.18 (5.15)	7.29 (9.88)
Regular Soda or Energy Drinks ¹	5.86 (9.50)	3.42 (8.62)	1.74 (3.34)	6.90 (8.10)	8.44 (11.08)
Juice					
100% Fruit Juice	3.09 (5.60) ¹	2.85 (6.35)	3.75 (5.12)	5.39 (7.90)	6.21 (9.76) ⁷
¹ p<0.01					
² n=311; ³ n=310; ⁴ n=32; ⁵ n=52; ⁶ n=79; ⁷ n=145					

Table 6.5 Purchasing Frequency: Fruits, Vegetables, and Beans Purchasing in the previous 30 days by store visits in the previous 30 days,n=312 Mean (SD)					
	All Store Visits	≤4 Visits n=33	5-8 Visits n=53	9-20 Visits n=80	≥21 Visits n=146
Fruit					
Fresh Fruit	5.67 (6.93)	6.30 (6.71)	6.21 (3.49)	5.95 (6.05)	6.36 (8.48)
Canned Fruit in Syrup	0.91 (1.98)	0.52 (0.97)	0.58 (1.43)	0.86 (1.88)	1.14 (2.32)
Canned Fruit in Juice ¹	0.80 (1.84)	0.79 (1.93)	0.72 (1.60)	0.83 (1.89)	0.82 (1.90)
Frozen Fruit	0.34 (1.20)	0.33 (0.85)	0.53 (1.44)	0.51 (1.54)	0.28 (0.93)
Vegetables					
Fresh Vegetables	6.50 (5.51)	3.67 (3.46)	3.68 (3.91)	6.63 (3.73)	6.91 (7.00)
Frozen Vegetables	2.07 (2.58)	1.73 (2.14)	2.17 (2.85)	2.26 (2.78)	2.01 (2.47)
Canned Vegetables	1.47 (2.82)	1.12 (2.85)	1.23 (2.68)	1.36 (2.93)	1.70 (2.81)
Canned Vegetables, Low Sodium	0.86 (2.72) ³	0.55 (1.12)	0.57 (1.22)	0.69 (2.47)	1.12 (3.41) ⁴
Beans					
Canned Beans: Baked, w/Pork, or Added Salt ²	1.20 (1.76)	1.15 (1.33)	0.85 (1.13)	0.93 (1.54)	1.49 (2.09)
Dried or Canned Beans, No Salt/Sugar	1.11 (2.38)	1.67 (2.15)	0.92 (1.16)	1.69 (3.84)	0.73 (1.48)
¹ p<0.01; ² p<0.05					
³ n=311; ⁴ n=145					

Table 6.6 Purchasing Frequency: Snacks Purchasing in the previous 30 days by store visits in the previous 30 days, n=312 Mean (SD)					
	All Store Visits	≤4 Visits n=33	5-8 Visits n=53	9-20 Visits n=80	≥21 Visits n=146
Savory Snacks					
Chips: Potato, Tortilla, Doritos, Cheese Curls ¹	4.77 (7.18)	2.91 (5.65)	1.96 (2.80)	2.95 (3.32)	7.21 (9.12)
Baked Chips	0.87 (2.91)	0.42 (0.90)	0.92 (1.85)	0.48 (0.95)	1.16 (4.00)
Pretzels, Low Sodium	0.69 (3.10) ²	0.22 (0.42) ⁵	0.51 (1.37)	0.41 (1.07) ⁸	1.01 (4.35)
Sweet Snacks					
Cookie, Cake, or Danish Pastry ¹	4.41 (7.01)	3.00 (4.29)	1.72 (2.16)	2.49 (2.73)	6.76 (9.22)
Candy (including Chocolate) ¹	4.03 (7.19)	2.39 (5.68)	1.40 (1.77)	3.04 (5.30)	5.90 (8.95)
Granola or Cereal Bar	1.76 (3.78) ³	2.00 (5.98) ⁶	1.25 (2.09) ⁷	1.77 (2.96) ⁸	1.89 (4.06) ⁹
Dried Fruits, Nuts, or Seeds	2.26 (4.49) ⁴	1.36 (1.83)	1.98 (4.50)	1.98 (2.47)	2.72 (5.61) ¹⁰
¹ p<0.01					
² n=310; ³ n=306; ⁴ n=311; ⁵ n=32; ⁶ n=31; ⁷ n=52; ⁸ n=79; ⁹ n=144; ¹⁰ n=145					

Table 6.7 Purchasing Frequency: Cooking Fats and Condiments Purchasing in the previous 30 days by store visits in the previous 30 days, n=312 Mean (SD)					
	All Store Visits	≤4 Visits n=33	5-8 Visits n=53	9-20 Visits n=80	≥21 Visits n=146
Cooking Fats					
Butter, Margarine or Shortening	1.68 (2.05)	1.12 (0.99)	1.18 (1.47)	1.73 (2.01)	1.95 (2.36)
Oil	1.14 (1.32) ¹	0.88 (0.70)	0.92 (0.78)	1.37 (1.96) ²	1.15 (1.13)
Cooking Spray	0.53 (0.83)	0.33 (0.60)	0.58 (0.66)	0.46 (0.87)	0.58 (0.91)
Reduced Fat Butter or Margarine	0.40 (0.87)	0.48 (0.80)	0.34 (0.68)	0.46 (0.95)	0.37 (0.89)
Condiments					
Mayonnaise	0.75 (1.15) ¹	0.45 (0.62)	0.58 (0.84)	0.81 (1.14) ²	0.84 (1.32)
Light Mayonnaise	0.37 (0.78)	0.52 (0.71)	0.28 (0.50)	0.34 (0.98)	0.39 (0.76)
¹ n=311; ² n=79					

6.3.5 Diet of customers of small rural food stores

The overall reported intake for both fruits and vegetables was low (**Table 6.8**). Fruit and vegetable intakes excluded reported intakes >13.0 servings per day as improbable values. The mean combined daily servings of fruits and vegetables reported was about three servings per day. Compared to the recommendations provided by the 2015-20 Dietary Guidelines for Americans, only about 26% of participants said they consumed the recommended daily amount of fruits and vegetables for a sedentary person of the same sex and age. However, the reported percent of daily calories from fat in both the mean and the median was low; both were below the recommended daily limit of 35% of calories from fat. A statistically significant difference was found in the distributions of the frequency of reported percent of calories from fat when categorized by store visit.

Table 6.8 Reported Intakes of Fruits and Vegetables and Dietary Fat By store visits in the previous 30 days Mean (SD)					
	All Store Visits	≤4 Visits n=33	5-8 Visits n=51	9-20 Visits n=79	≥21 Visits n=141
Daily Servings of Fruits and Vegetables	3.03 (2.58) ²	3.74 (2.80)	3.00 (2.66)	3.05 (2.60) ⁵	2.93 (2.50) ⁶
Percent of Daily Calories from Fat ¹	32.60 (4.42) ³	31.88 (4.21)	31.73 (4.45) ⁴	32.15 (4.75)	33.33 (4.19)
¹ p<0.01					
² n=298; ³ n=303; ⁴ n=50; ⁵ n=77; ⁶ n=137					

6.4 Summary

In this investigation of regular small store customers in rural Maryland, our participants were customers at a wide variety of small store types which reflected the heterogeneity of small food stores. The participants, who tended to be older, largely chose to shop at the small store where data were collected based on convenience. Participants were frequent small store users and tended to shop at small stores most days of the week. While most participants had a dietary fat intake within a healthy range, the daily intake of fruits and vegetables was low in the sample. For less healthy foods and beverages, purchasing tended to be highest for sugar-sweetened beverages, chips, and high-sugar content snacks. In healthy foods, fresh fruits and vegetables tended to have the highest purchasing frequency. Participants tended to have correct answers for the nutrition knowledge questions. For food-related self-efficacy, participants tended to respond that implementing the proposed healthy diet choices would be “very easy.” The behavioral intentions responses were mixed with some healthier choices, such as using cooking spray to fry eggs and drinking water, tending to be popular responses while the less healthy choices, such as snacking on regular chips or electing higher fat milks, also tended to be popular responses. The results of this chapter are informative in terms of exploring the food choices and store utilization habits of rural Maryland small store customers in order to begin to understand how small stores could be utilized to increase access to healthy foods for this population

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Chapter 7. Results: Aim 4

A quantitative analysis of the relationship between the small store food environment and customer food purchasing and diet

7.1 Introduction

The relationship between the food environment in small rural food stores and consumer food purchasing and diet in Maryland has not been studied. To examine the use of small rural food stores in Maryland as a platform for healthy foods, the relationship between healthy foods stocked in small food stores and the purchasing of sugar-sweetened beverages (SSB), snacks with a high-fat and/or high-sugar content, fruit and vegetable intake, and dietary fat was studied to examine the following aim and hypotheses:

Aim 4: To investigate the relationships between the small store food environment and food purchasing and dietary intakes among small store customers in rural Maryland.

Hypothesis 4A: Customers will make less frequent purchases of sugar-sweetened beverages (SSB) and unhealthy snacks if healthier alternatives are available in the small rural food stores they use.

Hypothesis 4B: Customers of small stores that stock a larger number of healthy foods will have a higher intake of fruits and vegetables and a lower intake of dietary fat.

7.2 Methods

7.2.1 Data Collection

To examine the availability of healthy foods in small food stores, a survey of the food environment was conducted in 34 stores across seven rural Maryland counties (see: section 3.3.1). Each county had a total of four to seven stores sampled. The number of food stores with environmental assessments conducted for this study were limited due to a discrepancy in store lists during data collection. The food store environmental assessment was used to ascertain the availability of healthy foods in small rural food stores by evaluating the presence of 50 individual food items, store features such as aisles and cash registers, and prepared food options (see: **Appendix A**). To quantify healthy beverage availability for Hypothesis 4B, the availability of four varieties of low-calorie beverages were examined: bottled water, diet iced tea, diet soda, and low-sugar flavored water. In the healthy snack availability, the following eight foods were included in creating the variable: baked chips, graham crackers, low-fat popcorn, low sodium crackers, low-sugar pudding packs, low-sugar and low-fat granola bars, nuts (including salted), pretzels, and trail mix (without chocolate). Although many of the items including in healthy snack availability are not healthy promoting foods, the selected foods are considered a healthier alternative to popular high-fat and/or high-sugar snacks such as chips, cookies, cakes, or Danish pastries. The Healthy Food Availability Index (HFAI) was created via a summative score of the checklist to quantify the overall availability of healthy foods in the stores. In the HFAI scoring where a higher score indicated a larger availability of healthy foods, the total score possible ranged from 0 to 31. The details on

the full scoring of the food source checklist are available (Campbell et al., under review). The HFAI scores were categorized into quintiles for analysis to facilitate interpretation.

For consumer data, a survey was conducted that collected data on demographics, small store utilization, and purchasing history in the previous 30 days for 32 foods and beverages including fruits, vegetables, beans, snacks, beverages (dairy, low-calorie, sugar-sweetened, and juice), cooking fats, and condiments (see: **Appendix G**).

Participants 18 and older were recruited via a convenience sample (see: section **3.3.3**). To create an SSB variable, the frequency of purchasing regular soda and/or energy drinks, and fruit drinks including Vitamin Water, sports drinks, cocktails, and lemonade in the previous 30 days were summed. To create a variable for customer purchasing of high-fat and/or high-sugar snacks, the frequency of purchasing the following items in the previous 30 days was summed: chips (including potato chips, Doritos, tortilla chips, cheese curls); cookies, cake, or Danish pastry (i.e. Honey bun, Tastycake); and candy (i.e. candy bars, chocolates, Skittles, gummy bears).

To assess fruit and vegetable consumption, the 10-item All Day Fruit and Vegetable Intake Screener from the National Institutes of Health was conducted and established scoring was used to ascertain a reported number of servings of fruits and vegetables per day (Thompson et al., 2000) (see: **Appendix H**). To create a variable that facilitated interpretation of the results of the analysis, the daily recommended total intake of fruits and vegetables was determined for each participant using the 2015 Dietary Guidelines for Americans (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2015). Using the age of each participant, the recommended daily servings of fruits and vegetables was determined for a sedentary individual. The

reported fruit and vegetable intake estimate for the screener was then divided by the recommended daily servings to create a dependent variable that is the percentage of the recommended daily servings of fruit and vegetables reportedly consumed by participants. This variable was then multiplied by 100 and rounded to the nearest integer to create a count variable.

The reported fat intake was obtained from the Percentage Energy from Fat Screener from the National Cancer Institute that assesses the percentage of a respondent's reported daily calories from fat by determining the frequency of consumption of 16 foods (Thompson et al., 2007) (see: **Appendix I**). The percentage of energy from fat was dichotomized where 35% or less indicated a healthy fat intake and more than 35% in unhealthy fat intake.

7.2.1 Data Analysis

For Hypothesis 4A, count models were used to examine the relationship between healthy snack availability in the store and high-fat and/or high-sugar snack purchasing and the relationship between low-calorie beverage availability and SSB purchasing. For Hypothesis 4B, a count model was used to examine the relationship between the food environment and percentage of the recommended daily servings of fruit and vegetables reportedly consumed. To account for the over-dispersion in all three dependent variables a negative-binomial regression model was used. To examine the relationship between overall healthy food availability, as quantified by the HFAI score, and reported percentage of daily calories from fat for Hypothesis 4B, a binary logistic regression model was used where the outcome was odds of unhealthy fat intake (reported percentage of total daily calories from fat >35%).

In the model examining the relationship between healthy snack availability in the store and high-fat and/or high-sugar snack purchasing, all of the stores stocked at least two of the eight healthy snacks surveyed. Therefore, a categorical variable was created where 1 signified two healthy snacks stocked at the store; 2, 3, and 4 were three, four, and five snacks stocked, respectively; and 5 was six or more snacks stocked.

For the independent variable of interest in the model examining the relationship between low-calorie beverage availability on SSB purchasing, low-calorie beverage availability was a summative variable of four varieties of low-calorie beverages. Only one of the stores stocked one variety of low-calorie beverages and six stores stocked two varieties. The total number of participants who were customers of these stores was too low to use a four-category variable for low-calorie beverages. Therefore, the availability of the low-calorie beverages in stores was dichotomized for analysis to compare stores that stocked one to three varieties of low-calorie beverages to those that stocked all 4 varieties.

To examine the relationship between the food store environment and fruit and vegetable intake, the number of varieties of fresh fruits and the number of varieties of fresh vegetables were categorized. The categories for both fresh fruits and fresh vegetables on the data collection instrument were 0; 1-2; 3-5; 6-10; 11-20; and ≥ 20 as per their categories on the data collection instrument and used at the independent variables of interest (see: **Appendix A**). For fresh vegetables, 0 indicated that no fresh vegetables were stocked in the store; 1 was one to two varieties stocked; 2 was three to five varieties; 3 was six to ten; and 4 was 11 or more (the categories 11-20 and ≥ 20 were collapsed because each category had a low number of observations). A categorical

variable for the number of varieties of fresh fruits stocked was created similarly with 1 for one to two varieties stocked; 2 for three to five; and 3 for six to ten (there were no stores that stocked 11 or more fruit varieties).

All models controlled for the a priori control variables frequency of visits in the previous 30 days to the small store where data collection took place, sex, age, education, and employment status. To facilitate analysis and interpretation of the models, continuous variables that were not normally distributed were categorized, and ordinal and nominal categorical variables were dichotomized. Small store visits were categorized as 1-4 visits in the previous 30 days; 5-8 visits; 9-20 visits; and >20 visits. Age was categorized into the following age groups: 18-29 years, 30-39, 40-49, 50-59, and 60 and over. Dummy variables were used in the models for the small store visits and age variables, Education was dichotomized into high school education and below or education beyond high school. Employment was dichotomized into currently unemployed or on disability versus currently employed or retired.

7.3 Results

In **Table 7.1**, the results of the model examining the relationship between high-fat and/or high-sugar snack purchasing frequency and healthy snack availability in rural Maryland small food stores are presented. When controlling for confounders, customers from both stores with three healthy snack options stocked and four healthy snack options stocked had a statistically significant 45% decrease in the rate of high-sugar and -fat snack purchasing frequency compared to those who were customers of stores with two healthy snacks stocked. When compared to customers who utilized small stores the least frequently (1-4 times in the previous 30 days), customers who visited small store 9-20

times per month had over a 50% higher rate of high sugar and fat snack purchasing frequency, holding other variables constant. Similarly, the customers who used small stores most frequently (≥ 20 times in the previous 30 days) had a ~260% greater rate of high sugar and fat snack purchasing than the customers who visited the small store 1-4 times in the previous 30 days. Women had over a 30% lower rate of purchasing high sugar and fat snacks compared to men, holding confounders constant.

Table 7.1 Association between High-Fat and/or -Sugar Snack Purchasing Frequency and Healthy Snack Availability in Rural Maryland Small Food Stores n=175		
	RR	95% CI
Healthy Snack Varieties Available in Store		
2 varieties vs. 3 varieties	0.55 ¹	0.32-0.94
2 varieties vs. 4 varieties	0.55 ¹	0.32-0.95
2 varieties vs. 5 varieties	0.68	0.40-1.14
2 varieties vs. ≥6 varieties	0.75	0.49-1.14
Store Visits in the Previous 30 Days		
1-4 vs. 5-8	1.06	0.63-1.80
1-4 vs. 9-20	1.53 ¹	1.01-2.32
1-4 vs. >20	2.61 ²	1.73-3.93
Sex		
Male vs. Female	0.66 ¹	0.48-0.92
Age Categories		
18-29 vs. 30-39	1.22	0.72-2.08
18-29 vs. 40-49	0.88	0.53-1.45
18-29 vs. 50-59	0.61	0.37-1.01
18-29 vs. 60+	0.67	0.40-1.14
Level of Education		
High School/GED vs. Post High School Study	0.70	0.48-1.01
Employment Status		
Unemployed/Disability vs. Employed/Retired	0.85	0.56-1.28
¹ p<0.05; ² p<0.01		

In the model examining the relationship between the availability of low-calorie beverages and SSB purchasing, holding confounders constant, the relationship was not statistically significant (**Table 7.2**). However, regular small store customers who visited small stores the most frequently (>20 visits in the previous 30 days), had almost three

times the SSB purchasing frequency compared to customers who visited small stores the least frequently (1-4 visits in the previous 30 days). The model showed that, compared to men, women had approximately a 45% lower SSB purchasing frequency than men. In addition, the oldest adult customers, aged ≥ 60 years, had a ~51% lower SSB purchasing frequency compared to the youngest customers aged 18-29 years.

Table 7.2 Association between Frequency of Sugar Sweetened Beverage Purchasing and Low Calorie Beverage Availability in Rural Maryland Small Food Stores n=179		
	Rate Ratio (RR)	95% Confidence Interval (CI)
Availability of Low Calorie Beverages in Store		
1-3 varieties vs. 4 varieties	1.12	0.78-1.61
Store Visits in the Previous 30 Days		
1-4 vs. 5-8	1.31	0.73-2.34
1-4 vs. 9-20	1.47	0.90-2.40
1-4 vs. >20	2.79 ¹	1.72-4.52
Sex		
Male vs. Female	0.55 ¹	0.38-0.80
Age Categories		
18-29 vs. 30-39	1.48	0.82-2.67
18-29 vs. 40-49	1.52	0.85-2.72
18-29 vs. 50-59	0.87	0.50-1.49
18-29 vs. 60+	0.49 ²	0.27-0.87
Level of Education		
High School/GED vs. Post High School Study	0.81	0.54-1.21
Employment Status		
Unemployed/Disability vs. Employed/Retired	0.67	0.42-1.05
¹ p<0.01; ² p<0.05		

The results of the examination of the association between reported percent of recommended daily fruit and vegetable intake consumed and fresh fruit and vegetable availability are presented in **Table 7.3**. The results of the model did not show a statistically significant relationship between the predictor and dependent variables, holding confounder constant. The results of the non-exponentiated logistic model (data not shown) indicated that there may be a slightly non-linear relationship between the number of fresh vegetables available and the number of fresh fruit varieties available variables and the dependent variable. Therefore, the relationships presented in the dummy variables should be interpreted as comparisons between nominal categories. However, the relationships between the fruit and vegetable varieties available variables and the dependent variable are not statistically significant.

Table 7.3 Association between Reported Percent of Recommended Daily Fruit and Vegetable Intake Consumed and Fresh Fruit and Vegetable Availability in Rural Maryland Small Food Stores n=178		
	RR	95% CI
Number of Varieties of Fresh Vegetables Available		
0 vs. 1-2	0.80	0.39-1.63
0 vs. 3-5	0.91	0.52-1.58
0 vs. 6-10	1.31	0.69-2.49
0 vs. 11 or more	2.13	0.79-5.80
Number of Varieties of Fresh Fruits Available		
0 vs. 1-2	1.05	0.62-1.77
0 vs. 3-5	1.03	0.61-1.74
0 vs. 6-10	0.80	0.36-1.75
Store Visits in the Previous 30 Days		
1-4 vs. 5-8	0.88	0.59-1.33
1-4 vs. 9-20	1.17	0.85-1.61
1-4 vs. >20	1.12	0.81-1.54
Sex		
Male vs. Female	1.20	0.94-1.55
Age Categories		
18-29 vs. 30-39	0.88	0.57-1.36
18-29 vs. 40-49	0.90	0.59-1.38
18-29 vs. 50-59	0.82	0.56-1.22
18-29 vs. 60+	1.17	0.77-1.78
Level of Education		
High School/GED vs. Post High School Study	1.27	0.97-1.67
Employment Status		
Unemployed/Disability vs. Employed/Retired	0.97	0.71-1.32

The results of the examination of the relationship between overall healthy food availability in the small store, as measured by the HFAI, and the odds of consuming >35% of total daily energy from fat are presented in **Table 7.4**. None of the coefficients for the covariates in this model reached statistical significance.

Table 7.4 Association between the Odds of Consuming >35% of Total Daily Energy from Fat and HFAI in Rural Maryland Small Food Stores n=215		
	Odds Ratio	95% CI
HFAI Score Categories (Quartiled)		
3-6 vs. 6.5-8	1.39	0.52-3.71
3-6 vs. 9-15	1.21	0.46-3.21
3-6 vs. 16-25.5	1.38	0.50-3.81
Store Visits in the Previous 30 Days		
1-4 vs. 5-8	1.17	0.40-3.50
1-4 vs. 9-20	0.67	0.25-1.76
1-4 vs. >20	1.64	0.67-3.98
Sex		
Male vs. Female	0.65	0.32-1.30
Age Categories		
18-29 vs. 30-39	1.17	0.34-4.08
18-29 vs. 40-49	1.95	0.60-6.39
18-29 vs. 50-59	1.68	0.55-5.16
18-29 vs. 60+	0.64	0.19-2.14
Level of Education		
High School/GED vs. Post High School Study	0.75	0.36-1.58
Employment Status		
Unemployed/Disability vs. Employed/Retired	0.69	0.30-1.59

7.4 Summary

In this analysis of the investigation between the rural Maryland small store food environment and customer food purchasing and diet, statistically significant relationships were found between high-fat and/or high-sugar snack purchasing frequency and healthy

snack availability in rural Maryland small food stores, holding confounders constant (**Table 7.1**). These findings support the increase of healthy snack availability in small stores to reduce the purchasing of unhealthy snacks among rural Maryland customers. The relationships between the availability of low calorie beverages and SSB purchasing (**Table 7.2**), the number of varieties of fresh fruits and vegetables available and the reported percent of recommended daily fruit and vegetable intake consumed (**Table 7.3**), and overall healthy food availability in the small store, as measured by the HFAI score, and the odds of consuming >35% of total daily energy from fat (**Table 7.4**) were not statistically significant. Further discussion of the results of this analysis will be examined in the discussion and conclusions chapter.

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Chapter 8: Discussion and Conclusions

The goals of this investigation were to understand the role of rural Maryland small food stores in the food choices and dietary patterns of regular customers and to examine the use of these small stores as a platform for increasing access to healthy foods. The first part of this chapter will describe how well the specific aims, research questions, and hypotheses were addressed. The second part of this chapter will discuss the key findings of this dissertation in the context of other work in the field. The third part of this chapter will address the strengths and limitations of the study. In the fourth part of this chapter are the implications for future interventions. Finally, the implications for policy will be discussed in the fifth part of this chapter.

8.1 Overview of Key Findings

Aim 1: To understand the perspectives and behaviors related to food purchasing of small store customers in rural Maryland.

Research question 1A: What food sources are used by rural Maryland small store customers?

In this sample of small store customers in rural Maryland, respondents reported that their most frequent visits to any food store were to small stores. Most respondents in the sample chose to shop in small food stores more than once a week; five participants shopped at small stores three times a week or more. The most commonly named chain of large stores frequented by respondents was Walmart. Supermarkets were another large food store cited by the vast majority of participants. The majority of respondents shopped at large food stores every one to two weeks. Participants mentioned non-traditional food

sources, such as the dollar store and the Amish market, that reflected the heterogeneity of food sources in rural Maryland.

Research question 1B: How do knowledge and information about nutrition influence food purchasing?

The two aspects of diet that were asked about in the interviews and used to elucidate the influence of nutrition knowledge and information on food purchasing was sodium and fat content of foods. Sodium was generally understood to have a negative effect on health. Five participants noted that they checked for sodium levels in foods. However, most of those respondents either checked only sometimes or did not specify how often they checked; only one participant specified checking for sodium most of the time. The relationship between fat in foods and health was vaguely understood, and the majority of respondents did not express concern with the fat content of their foods. In the link between health and nutrition information and food purchasing, individual customers noted that receiving health information about foods was a factor that could influence food purchasing.

Research question 1C: What are the facilitators and barriers to healthy food purchasing?

When asked what makes it easier to access healthy foods, the participants in the study did not name any direct facilitators to healthy food purchasing. However, a key perception that emerged was that personal choice was a central influence over healthy food purchasing. Another key perception was if there were less “junk foods” in the stores, then it would be easier to select healthy foods. Among the barriers to healthy food purchasing, lack of a local supermarket was a key barrier. Seasonality and lack of fresh local produce in the winter were reported as another barrier. Time was reported as a

barrier because it was perceived that purchasing healthy foods required time to sit down and plan. Knowledge and uncertainty as to what to seek out for healthy foods and desire to consume unhealthy foods were also cited as barriers.

Research question 1D: How can rural Maryland small store customers be encouraged to purchase healthy foods?

In exploring how participants thought other small store customers could be encouraged to purchase healthy foods, in-store taste tests to promote products was a key idea. Participants reported stores that used free samples as a product promotion technique, including Walmart. It was thought that for individuals who associated healthy foods with poor taste, free samples could be a motivator to try healthy foods. In-store advertising and displays were another key suggestion from participants.

Aim 2: To understand the perspectives of rural Maryland small store owners on healthy foods and their behaviors related to food sales.

Research Question 2A: How do small store owners in rural Maryland perceive their customer base and popular products?

The perceived customer base varied among store owners depending on the store and location. Almost half of the store owners viewed their businesses as community stores with a heavy local customer base. Other store owners had seasonal variations in customers, particularly customers from the boating community on the Eastern Shore of Maryland. For two stores located next to major highways, travelers were an important element of their customer base. One store owner catered to the Latino community with a range of Mexican products. The beverages perceived as the most popular by store owners

were sugar-sweetened beverages, alcohol, and bottled water. The most widely mentioned popular snack food was chips. For core food items, milk, bread, juice and cereal were commonly perceived as popular.

Research Question 2B: How do small rural store owners set prices?

To set prices, the methods and percentage mark-up varied widely across stores and products. For packaged goods, store owners reported that their pricing methods varied from using the preset prices on the product packaging, to choosing from different tiers of the wholesalers' suggested pricing, to pricing slightly below competitors' pricing. Ready-to-eat foods prepared in the store had more factors to consider in setting prices than packaged goods. For foods prepared in the store there were overhead costs that included the cost of labor and ingredients. The cost of ingredients was described to fluctuate for items like seasonally-available perishable foods. Price planning varied among participants. One key informant described the process of setting and monitoring prices using spreadsheets. Another key informant with less rigorous record keeping recounted the discovery that the store was losing money on prepared foods because the product pricing was below cost. Overall, packaged goods had a markup price range of 10% to 50% while prepared foods had a range of 40% to 50%.

Research Question 2C: What is the experience of store owners in terms of merchandising and promotion?

There were two principal actors who decided product placement, or merchandising, in the store: the store owner and the product vendor. When store owners decided their own product placement, they considered strategic positions in the front and back of the store and customer traffic patterns. Seasonal, sale, or other merchandise that

store owners wanted to sell quickly was often placed at the front of the store. Core grocery food items such as bread and milk were often placed at the back of the store so that customers would be exposed to other merchandise as they moved throughout the store.

When vendors decided product placement, such placements were often part of their contracts with the store. Incentives were offered to store owners for preferred product placement and included financial compensation and display equipment. For promotions, in-store marketing focused on signage and product placement. Signage was provided by the store owner, particularly for prepared foods, or by vendors. Although store owners expressed a desire for additional signage, available space was perceived as a barrier. A key theme that emerged was the importance of product promotion in the sales of perishable, prepared foods. Introductory pricing, free samples, and combination meal specials were used to in the introduction and promotion of new prepared foods. Price specials were also used as a way to sell prepared foods close to expiration. Store owners had mixed success in engaging in marketing in the local community to promote their stores. Marketing strategies included sponsorship of local school sports teams, involvement with churches, and newsletters. Some store owners utilized store websites to advertise their stores and post lunch specials. Media advertising was perceived as very expensive. The majority of store owners considered their relationships with customers to be positive and viewed relationship building through the lens of friendship in order to build rapport. Few store owners perceived themselves as confident in their abilities to leverage their relationships with customers into increased sales. Only one store owner had a previous background in sales.

Research Question 2D: What are store owners' perceptions of healthy foods and the role the foods play in their businesses?

There was a contradiction between what store owners perceived as “healthy foods” and the healthy foods stocked in their stores. Store owners principally named fresh and less processed foods such as fruits, vegetables and lean meats as healthy foods; few processed foods were described as healthy. However, many of the foods described as “healthy foods stocked” in the stores were highly processed foods such as artificially- and sugar-sweetened beverages and fat- and sugar-free ice cream. Low-income customers were perceived as having low levels of knowledge or interest in nutrition, while high-income customers were perceived to have a higher level of concern about nutrition. Store owners did not perceive the product selection in their stores as influencing customer purchasing habits in terms of healthy versus unhealthy foods. The current market for healthy foods in the small stores studied was thought to be poor and store owners expressed doubts about their ability to sell healthy foods. Although not stated explicitly, the store owners implied that they believed healthy foods were highly perishable and that lack of customer interest would lead to losing stock and spoilage if additional healthy foods were stocked. Other barriers to stocking healthy foods were the need for cold space to store and/or display healthy perishable foods and wholesale supplies at a price and quantity that was accessible to small store owners.

Aim 3: To explore factors surrounding food choices among small store customers in rural Maryland.

Research Question 3A: What are the small store utilization motives and habits of regular rural small food store customers in Maryland?

Regular small store customers in rural Maryland utilized the small stores heavily. While the mean number of visits to small stores was over five times per week, the most frequent customers returned to the small store multiple times per day. The most common reason for shopping at the small store was convenience, followed by good service and better quality of foods.

Research Question 3B: What are customer food purchasing and dietary habits?

The three items on the food purchasing survey (that asked about purchasing of foods at any store) with the highest mean purchasing frequency per month were sodas, bottled water, and fruits. The purchasing frequency of fresh vegetables was relatively high compared to other items on the survey. The relatively high reported purchasing frequency of fresh fruits and vegetables was discordant with the daily intake of fruits and vegetables; more than half the respondents reportedly ate less than 2.5 servings per day. More than 75% of respondents reported having a healthy intake of fat.

Research Question 3C: To examine food-related psychosocial characteristics including nutrition knowledge, food-related self-efficacy, and behavioral intentions.

The psychosocial questions asked on the customer survey were analyzed individually. For the nutrition knowledge questions, the majority of respondents provided the correct answer indicating they had at least some knowledge related to calories and fat in foods and cooking methods. In the food-related self-efficacy questions, the majority of

the respondents considered the proposed food habits, such as having fruits and vegetables as a snack, to be “very easy.” The answers to the behavioral intentions were mixed where the majority of respondents intended to use a high energy density cooking medium for frying eggs and buy a higher fat milk in the future. In contrast, most respondents intended to eat a low energy density salty snack and drink water versus soda or diet beverages.

Aim 4: To investigate the relationships between the small store food environment and food purchasing and dietary intakes among small store customers in rural Maryland.

Hypothesis 4A: Customers will make less frequent purchases of sugar-sweetened beverages (SSB) and unhealthy snacks if healthier alternatives are available in the small rural food stores they use.

Hypothesis 4A was partially supported by the results of the analysis. A regression model was used to examine the relationship between high-fat and/or high-sugar snack purchasing frequency and healthy snack availability in rural Maryland small food stores. The models controlled for the a priori confounders store visits in the previous 30 days (a proxy for frequency of exposure to the food environment), sex, age, education, and employment status. Customers from stores with either three healthy snack options stocked or four healthy snack options stocked had a statistically significant 45% decrease in the rate of high-sugar and -fat snack purchasing frequency compared to customers of stores with two healthy snack options stocked. In the examination of the relationship between the availability of low calorie beverages in the store and sugar sweetened beverage (SSB) purchasing, the results were not statistically significant.

Hypothesis 4B: Customers of small stores that stock a larger number of healthy foods will have a higher intake of fruits and vegetables and a lower intake of dietary fat.

Hypothesis 4B was not supported by the results of the analysis. The first model used in this analysis examined the relationship between two predictors, the number of varieties of fresh vegetables and the number of varieties of fresh fruits in stock in the small store, and the daily reported fruit and vegetable intake (measured as the reported percentage of the recommended fruit and vegetable intake presented in the 2015-20 Dietary Guidelines for Americans) while holding the a priori confounders constant. The results of this model were not statistically significant and did not support the association proposed by this hypothesis. The second model used to test Hypothesis 4B examined the relationship between the overall healthy food availability in the small store (as measured by the HFAI score) and the reported percentage of total daily calories from fat, hold the a priori variables constant. The results of this model were not statistically significant and did not support the hypothesis.

8.2 Discussion

This mixed-methods investigation of the potential use of small stores as a venue to increase access to healthy food is unique in that it is the first study on this topic to be conducted in this area of rural Maryland. This study qualitatively explored the supply-side of the rural small store via IDIs with small store owners in a variety of counties. On the demand side, this study used IDIs to qualitatively investigate the perspectives of small store customers on food purchasing. Through the use of surveys, this study quantitatively examined the factors surrounding food choices and the relationship between the small store food environment and food purchasing and dietary intakes among small store

customers. The study of small stores in rural areas is a burgeoning field. Therefore, to contextualize the results of this study in the literature, comparisons to previous work in this discussion will include work from the rural setting and work from the more extensively studied urban setting.

Heterogeneity in types of small stores. Generalizing the findings of small store investigations in urban settings to rural areas and vice versa must be taken with caution because of the differences in types of small stores. In this study, the definition for a small store was a food store with less than 2,500 square feet of retail space. A wide variety of store types were included in the qualitative and quantitative investigations because there is a heterogeneity of types of small stores in rural Maryland. The stores included in this study included convenience stores, beer, wine, and liquor stores, gas station convenience stores, marinas, and many others. Work in small rural food stores in Texas has also included a variety of store types including dollar stores and *pulgas* (flea markets), reflecting the variety of food sources in the area (Bustillos et al., 2009; Dean et al., 2011). In urban areas, small store research has largely centered on corner stores, a store type also known as a bodega in New York City (Cavanaugh et al., 2013; D'Angelo et al., 2011; Ruff et al., 2016). Although the exact criteria for defining corner stores has not been defined, the Food Trust definition of corner stores are those with less than 2,000 square feet, four aisles or less, and one cash register (The Food Trust, 2014). The Nutrition Environment Measures Surveys (NEMS), one of the most widely used sets of tools for quantifying healthy food availability in retail food environments, has a tool specifically for small stores termed the NEMS Corner Stores Measures (NEMS-CS) (Cavanaugh et al., 2013; Honeycutt et al., 2011). Because urban investigations tend to examine corner

stores, and the variety of store types in rural areas tends to be heterogeneous, the generalizability of urban results to rural areas may have limitations.

Customer base in rural versus urban small stores. In the results of the IDIs in this study, there was heterogeneity in the store owner reports about their customer base. Many store owners reported that their customer base came from the local community. In areas with a tourism industry store owners reported seasonal fluctuations in their customer base. Other store owners cited the proximity of their store to the highway as an influence in their customer base. Urban small store investigations tend to target neighborhood small foods stores located within or in close proximity to residential areas, largely low-income communities, where distances are small (Cavanaugh et al., 2014; D'Angelo et al., 2011). Results from a study in Baltimore showed that 97% of participants walked to their food sources (D'Angelo et al., 2011). In the rural context, where distances are large and population density is low, differences in transportation is an issue that may pose a limitation in how urban results can be applied.

Frequency of small store visits. Although the distance and customer base may differ between urban and rural small stores, the frequency of utilization by customers in this study was found to be high, similar to urban stores. The participants in this study were regular small store customers and the mean number of visits to small stores in the 30 days prior to data collection was 22.8. Similarly, in urban Baltimore, among participants who reported using corner stores as their primary retail food source, 75% shopped at corner stores 5-7 times per week (D'Angelo et al., 2011). The results from interventions targeting regular small store customers in urban areas may inform future

interventions in rural areas that aim to increase access to healthy foods among regular users of small stores.

Barriers to healthy food purchasing. In the results from this study, participants reported that a lack of access to a local supermarket was a key barrier to healthy food purchasing; this finding was similar to other studies in rural areas (Carnahan et al., 2016; Evans et al., 2015). Comparable findings have resulted from a variety of investigations in urban areas, including among adolescents (Christiansen et al., 2013; Dubowitz et al., 2015; Lucan et al., 2010). A key barrier to healthy food access reported in this study was a lack of fresh local produce in the winter. The proximity of fresh produce production and access during the growing season is an element of the rural setting that is distinct from urban areas.

Store owner skill sets. Previous studies in urban areas have incorporated store owner capacity building into the intervention package. In Los Angeles, investigators that performed corner store conversions as part of a multi-level corner store intervention utilized a corner store expert who had experience in converting small stores into healthy stores and was a former corner store owner (Ortega et al., 2015). In Baltimore, guidance on food purchasing, stocking, and product placement was combined with cultural guidelines to assist Korean-American corner store owners in building better relationships with their customers and members of the local community (Song et al., 2009). The qualitative findings in this study suggest that there is a heterogeneity of store owner business management and sales skills in this sample from rural Maryland. The results of this study indicate that future work in rural Maryland can incorporate best practices from urban interventions to improve store owner business management and sales capacity.

Store owner perceptions of customer attitudes towards healthy foods. Store owners in this study reported that they perceived customer disinterest and lack of knowledge about healthy foods, particularly among low-income customers. Store owners reported a negative perception of the potential for healthy foods sales in their businesses. Similar results have recently emerged from Baltimore where taste preferences and perceptions of customers' lack of interest in their own health were reported to be challenges to stocking healthy foods (Kim et al., 2017). Evidence that there is a demand for healthy foods may be required to encourage store owners to stock these foods.

8.3 Strengths and Limitations

The principal strength of this mixed-methods study was that it combined analytic approaches to explore perspectives on the small store food environment, the supply and demand of healthy foods in small stores, and to examine the relationship between the small store food environment and food purchasing and dietary intakes of regular customers. The advantage of the mixed-methods study design is that it provides for a deeper, and richer understanding of the concept being explored; this is particularly important for this study because it is an exploratory investigation. For the qualitative portion of the study, the customers' and store owners' perceptions of healthy foods and role that the foods play in the small store environment were able to be examined in detail and in-depth. In the quantitative portion of the study, the overall sample size (n=312) gave a robustness to the study so that a variety of analytic techniques could be explored.

This study provides valuable insight into an underexplored arena, the rural small store, for health practitioners and researchers who are interested in using the rural small store as a vehicle to increase access to healthy foods. Small stores in urban areas,

particularly corner stores, have an established history in the food environment literature, and interventions to increase access to healthy foods (Cavanaugh et al., 2014; D'Angelo et al., 2011; Gittelsohn et al., 2010; Gittelsohn et al., 2013; Ortega et al., 2015). The results of this exploratory study offer a view into a unique environment, rural Maryland, where little examination of the retail food environment has taken place.

The heterogeneity of stores sampled reflects the variety of food sources available in rural areas. While the sample included small stores in traditional formats such as stand-alone convenience stores, gas station convenience stores, and small, independent grocers, a range of non-traditional formats were sampled as well. Stores that might not typically be included in investigations of small retail food stores such as liquor stores, “limited-service restaurants” (stores with a focus on carry-out foods such as delis), marinas, pharmacies, and sporting-goods stores.

The principal limitation in this investigation is the use of convenience sampling for both the qualitative and the quantitative data; this technique may have introduced bias in the results. During the course of data collection, a definition for the term “small store” was never established in communications with customers. Therefore, what the respondents considered to be a small store in their responses is unknown. There may have been a bias in the social desirability in the responses, store owners and customers were informed that the nature of the study was centered around healthy foods in the introduction to the study during the informed consent process.

In the qualitative investigation, the geographic frame was limited to three counties due to time and budgetary constraints. The interview transcripts were analyzed after all the data had been collected; there was no opportunity to refine the instrument or

iteratively collect the data with a slightly different focus based on the responses from the earliest interviews. Therefore, the information on emerging themes during the data collection was limited.

In the quantitative investigation, the data collection instruments for the customer survey were designed to be part of an intervention project and to collect pre- and post-intervention data to measure changes in factors surrounding customers' food choices, diet, and purchasing habits. The method of collecting data from a convenience sample of regular small store customers was intended to measure changes in the habits of the individuals the intervention would have targeted. However, because this data was analyzed as cross-sectional data, there external validity of the data from this population is limited. The psychosocial variables measured were not part of fully validated scales and, consequently, the results could only be analyzed as individual questions which has limited applicability. As a measure of the small store food environment, the Food Source Checklist is not a validated scale and was scored using a partial scoring system from another scale of the food environment currently under development from another group of investigators. To measure food purchasing, the data collected was purchasing frequency at all stores; data about food purchasing specifically in small food stores was not collected. There was no data collected on food purchasing quantity. In addition, the food purchasing data collected was not part of a validated survey instrument. The generalizability and applicability of the results using this data for future investigations is limited.

8.4 Implications for Future Interventions

The findings from this investigation have implications for interventions in rural Maryland that use small stores as a platform for increasing access to healthy foods. The qualitative data suggests that the owners of independently-operated small food stores would benefit from additional business skills training as an added value component of small store interventions. For the intervention, training small store owners on skills such as pricing, sales, and marketing would serve several purposes. The primary purpose would be to ensure the success of the intervention as the owner-operator of a small store is the main interface between the intervention and the target, small store customers. Skills training would provide an incentive to the store owner for participating in the intervention. For the interventionist, adding a skills training component would be beneficial in terms of building rapport with the store owners. If the intervention was conducted as part of an investigation, providing skills training would reduce bias in the study via reducing variability between sites and provides for better comparability. In a corner store intervention in California, store operators received extensive technical assistance from the study team that included training on business skills, accounting and bookkeeping (Ortega et al., 2015). The former corner store owner with expertise in corner store conversions that the study engaged was reported to result in strong partnerships with corner store owners.

A key theme that emerged from the qualitative data in both the customer and store owner interviews was an aversion to perishable foods in the small store. For the customer, there was a lack of trust in products sold in small stores. The thought was that products sold in small stores were of inferior quality and would often have been kept in

inventory past their expiration date. For store owners, there was a reluctance to invest in perishable stock because they did not think that there would be sufficient turn over to sell the products before expiration and feared losing their investment. Shelf stable foods are valuable and attractive to small store owners because the products are less of a risk. When a product has a long shelf life, there is increased opportunity to sell it before the expiration date. To overcome the challenges associated with perishable foods, interventionists have several avenues to explore to promote fruit and vegetable sales in small stores.

The first avenue to overcome challenges associated with fresh fruit and vegetable sales in small stores would be to focus on shelf-stable foods including frozen and canned produce. The majority of frozen and canned products, with the exception of canned, ready-to-eat fruit, do not help store owners reach an important goal, convenience food sales. Market research has shown that 84% of foods purchased in convenience stores are eaten within the hour (National Association of Convenience Stores & United Fresh). A variety of prepackaged, ready-to-eat fruits and vegetables are currently on the market and can be considered to increase fresh produce sales and consumption among small store customers. Individual servings of sliced apples rinsed in calcium and vitamin C to maintain color and freshness are offered through Crunch Pak LLC as well as individual servings of carrots and grapes treated with preservatives for freshness (Packaged Facts, 2011). Ready Pac Produce offers ready-to-eat salads, salad kits, and individual servings of fruits and vegetables with dips. Prepackaged fruits and vegetables offer the benefits of convenience, expiration dates established by the manufacturer, and brand recognition

because products like those offered by Ready Pac Produce are widely available in grocery stores across the US.

8.5 Implications for Policy

There is great interest in increasing access to healthy foods in communities where supermarket availability is limited. For the most part, the focal point of research on healthy food availability in small stores has been urban areas. Small stores are an essential part of the food environment and have received attention on the national stage as a platform to increase access to healthy foods. The \$400 million Healthy Food Financing Initiative (HFFI) from the Obama administration placed an emphasis on small stores as a vehicle to increase access to affordable and nutritious foods in areas where access to supermarkets is limited (Holzman, 2010). Grants through the HFFI in Maryland currently focus funding on urban initiatives (Healthy Food Access Portal, 2016). While the situation in urban Maryland is in need of structural investment to provide equitable access to healthy foods and improve health disparities, current political trends have brought the disenfranchisement of rural populations to the forefront of national concern.

Maryland is one of a handful of states that has a state-financed food access initiative. The Maryland Fresh Food Financing Initiative offers financing to small businesses offering healthy food options in underserved areas. Communities in rural Maryland that are interested in increasing local access to healthy foods and development of small businesses can provide outreach to small store owners to inform them about financing available to expand their businesses to sell an increased variety of healthy foods. Outreach should include connecting small store owners to the training and skill building resources necessary to successfully source, market, sell, and profit from healthy

foods. Ultimately, small store owners share a common goal: to successfully profit from their businesses. The most convincing argument that can be made to a small store owner to increase their offerings of healthy foods is that it will be a sound investment of time and money. Given that the financing to make such investments is available, creating a network of resources to ensure their success is a necessary next step.

8.6 Conclusion

This dissertation examined the potential of small stores in rural Maryland as a platform for increasing access to healthy foods. The regular small store customers who participated in this study had a high frequency of visits per month to small stores indicating a high exposure to the small store food environment. Although the relationships between the food environment and food purchasing and dietary intakes were weak in the quantitative analysis, the qualitative analysis indicated that there may be discrepancies in the level of sales and marketing skills among store owners that may confound the relationships in the models. Future work in rural Maryland small stores will need to build both the supply and demand for healthy foods if increasing long term access through small stores is to be a viable business venture.

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Appendix A-B: Qualitative Data Collection Instruments

Appendix A: In-Depth Interview Guide for Store Owner Interviews



Approved: March 1, 2013 IRB No.: 4421

Maryland Healthy Stores (MHS2) In-Depth Interview Guide: Retailers

Interviewer Name: _____

Store/Wholesaler Name: _____

Date: ____/____/____ Interview start time: ____:____AM/PM
Respondent

Name: _____

[Consent form here]

Purpose of this interview

I am working with a program, which is helping to bring healthier and affordable foods to stores in certain counties in Maryland. The project will work with retail store owners and managers to stock foods like low-fat milk, whole wheat bread, low calorie drinks, and low sugar cereals, and will promote these foods to your customers. The purpose of this interview is to help us understand how healthy foods could be stocked and promoted in your stores. You have been chosen to participate in the interview because you own, operate or work at a food retailer in our program area. During the interview, I will ask you how you make stocking and prices decisions regarding the foods you sell, how you promote those products, and how your business relationships and competition impact the sales and promotion of foods. Please answer the questions truthfully and to the best of your ability. There are no right or wrong answers. We are (I am) only here to gather information. Everything that is being spoken here is considered confidential and will not be discussed outside of our research team

Group A Questions - Storeowners

1. Tell me about your store. (Probe for who comes to the store and what kinds of things people buy.)
2. What foods are popular with adults? Any specific categories? (Probe for items people often buy together (i.e., chips and a soda; milk and bread)
3. What do you think of when you think of a 'healthy food (or beverage)'? Which of these foods or drinks do you stock? Which 'healthy' foods or drinks do people most often buy? Probe for categories. (Fruits/vegetables, LF Dairy, snacks, whole grain cereals and breads, low-sugar beverages)
4. What are the challenges you have experienced in stocking some of these healthy foods? (Probe for categories above.) How do you think you could overcome these problems (e.g., low consumer demand)?

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Data checked by:

Date of checking:.....

Data entered by:

Date of entry:

Form ID:

5. It sounds like stores establish relationships with particular suppliers/wholesalers/distributors. Can you tell me more about this? (Probe: Where do you get the products that you sell? How do you decide where to shop?)
6. What foods would you like to buy at (name of wholesaler) but cannot? (Probe for reasons and types/names/brands of foods.)
7. Tell me what happens when you shop at (name of wholesaler/distributor)? (shopping list, price checking, browsing). How often to you shop? What wholesale promotions attract you to purchase new items?
8. Tell me about the relationship you have with your customers. Describe your interactions. How does your relationship with them impact what they buy?
9. Could you describe the kinds of relationships that you have with other storeowners? How does your relationship with them impact what you stock in your store?
10. How does direct competition affect decisions you make on what to order, discontinue, what new products you try, and the prices you set? Do you typically aim to offer items that other stores have or do you try to offer something different?
11. Can you tell me about the types of foods that you don't carry and would like to bring in? (Probe for categories such as produce, low-fat/sugar/cal/FV/whole grain cereal, bread/beverages, produce)
12. How do you decide what price to set? (Probe for food categories above.)
13. How do customer purchasing decisions impact the foods stocked and the prices of those foods?
14. How do you decide which foods to promote in your store? How do you typically promote them? What promotions have worked/ not worked? How does competition affect how you promote these foods in your store?
15. What have you heard about trans fats? In what ways are your customers concerned about them?
16. What have you heard about sodium and food? In what ways are your customers concerned about sodium?
17. What messages/materials do you use to get your customers to buy foods? Are there materials/messages you would like to display but cannot? Probe.

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18. How do you decide where to display items in your store? Are there any restrictions on where foods are placed in your store? (Like to coke products have to be in a certain refrigerator case?)
19. About how much would you say your sales in tobacco products make up? Which tobacco product do you believe is most frequently sold? Is it about the same customers that purchase tobacco products? (probe about underage buyers)
20. Do you have special agreements with tobacco companies on stocking or sales for example?
21. Do you have any questions for me? Thank you so much for your time!

Observation during interview

Appendix B: In-Depth Interview Guide for Customer Interviews

Consumer Interview Guide



Approved: March 1, 2013 IRB No.: 4421

Maryland Healthy Stores (MHS2) In-Depth Interview Guide: Consumers

Interviewer Name: _____

Date: ____/____/____ Interview start time: ____:____AM/PM

Respondent
Name: _____

Data checked by:
Date of checking:.....
Data entered by:
Date of entry:
Form ID:
Worksite ID:.....

[Consent form here]

Purpose of this interview

I am working with a program, which is helping to bring healthier and affordable food to stores in the rural areas of Maryland. The project will work with store owners to stock foods like low-fat milk, whole wheat bread, low calorie drinks, and produce, and encourages customers to buy these healthier foods. The purpose of this interview is to help us understand how individuals make food purchasing decisions, and what can be done to change those decisions. You have been chosen to participate in the interview because you purchase foods from a retailer in our program area. During the interview, I will ask you how you make decisions about where to shop and what to buy, how price and availability impact those decisions, and what could be done to change where you shop or what you eat. Please answer the questions truthfully and to the best of your ability. There are no right or wrong answers. We are (I am) only here to gather information. Everything that is being spoken here is considered confidential.

1. Tell me about all the places you have gotten food in the last couple of weeks. (e.g., small convenient store, supermarket, carryout, farmers market, public market, virtual supermarket, restaurant)?
2. Tell me more about each of these places for getting food.
 - a. How often do you use (food source)?
 - b. What sorts of foods do you get at (food source)? Why did you choose (food source)?
 - c. Probe for price if not mentioned.
3. When buying foods, one thing that people talk about is fat. What have you heard about fat? [Probe on knowledge of saturated vs trans fat. Do they look for fat on food labels before purchasing? Calories from fat?]
4. People often talk about sodium too. What have you heard about sodium? Do you look at sodium levels when buying food? What do you associate with high sodium levels?

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Consumer Interview Guide


5. What do you think of when you think of healthy foods?
6. What kinds of healthy foods do you buy or would you like to buy?
 - a. Probe about foods in these categories: fruits/vegetable; low fat dairy; cereal; beverages; whole grains; packaged snacks
7. How do you shop for [healthy foods]?
8. What makes it harder or easier for you to get healthy foods?
 - a. Probe for access/accessibility to healthy food/transportation
9. What would make you more likely to buy something new at a small store?
10. What foods would you not buy at a small store?
11. What healthy foods do you wish the store carried?
12. How much of a price reduction would be needed to get you to purchase name of healthy food) as an alternative to (name of less healthy alternative)? (Probe categories: fruits/vegetable; low-fat dairy; cereal; beverages; whole grains; packaged snacks) Provide pairs of foods (regular chips vs baked chips) Which would you choose? Would price make a difference? Which do you think is healthier?
13. How does information regarding health or nutrition impact your decisions to purchase certain foods?
14. Have you noticed information regarding healthy foods at the stores you shop in? If so, what did they look like and how did they impact your decision to buy one food over another?
 - a. Probe for additional information about what kinds of communication would be helpful.
15. In what other ways we can use education, free samples, displays, posters, labels, or flyers to encourage individuals in your community to eat healthier foods. (If they mentioned print materials, probe on what they would look like).
16. Now I am going to shift gears a little and talk about tobacco. What are your perceptions of tobacco use in your area? Probe for information about youth versus adults.
17. Can you tell me about any promotions (like ads, signs, displays) for tobacco products in the stores you shop in? How do they impact people's decision to buy them? How do they impact young people's decision to buy them?

Do you have any questions for me? Thank you so much for your time!

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Appendix C-F: Quantitative Data Collection Instruments

Appendix C: Food Source Checklist

 Approved: August 16, 2012		MARYLAND HEALTHY STORES FOOD SOURCE CHECKLIST							
Food Source Name: _____		Date ____/____/____		Time: ____:____		Day: _____		Data Collector: _____	
Location: _____		Ethnicity of Store Owners _____		Accept WIC ____Y____N		Accept Food Stamps? ____Y____N			
Number of aisles: _____		Number cash registers: _____							
Supermarket__1 Medium Store__2 Small/Cornerstore Store__3 Deli__4 Convenience/Gas Station__5 Butcher__6 Street Vendor__7 Other__8									
Food Source Environment (*circle options)								For All Food Sources	
Features (all stores)		Yes	UK	No	Features (stores with delis/carryout's)		Yes	UK	No
Packaged prepared food sold					Choice of vegetable toppings* (tomato, lettuce, other: _____)				
Deli or carryout (e.g. cuts bologna)					Choice of meat				
Customers denied access to store (behind glass service)					Choice of whole wheat bread				
Alcohol sold					Self serve coffee/tea station* (artificial sweetener, LF creamer)				
Fountain drinks					Self administered choice of low fat/calories condiments *				
Vending machine					(low fat mayo, mustard, cheese)				
Food Availability (Y/N)									
Fresh Vegetables ____		Number of different varieties: 0 1-2 3-5 6-10 11-20 20+						Describe promotion of healthy foods on the menu	
Fresh Fruits ____		Number of different varieties: 0 1-2 3-5 6-10 11-20 20+							
Milk ____		Whole ____ 2% ____ 1% ____ Skim Milk ____ Reduced fat chocolate milk ____ Condensed ____ Price of LF milk US\$ ____/gallon (LF<2% fat)							
For below, indicate 1 = yes, 0 = no / * circle options									
Meal items (Proteins, Breads, Sides)			Snacks			Condiments/Beverages			
Beans/peas (blackeye/split/lentil) ____		Whole wheat bread ____		Yogurt ____		Low-fat popcorn ____		LF Creamer ____	
Canned fish (chunk light tuna, pink salmon, or sardines) ____		Soft corn or whole wheat tortilla ____		Canned Fruit (in water or juice) ____		Low sodium crackers ____		Artificial sweetener ____	
Fresh fish ____		Whole wheat pasta ____		Low sugar applesauce ____		Trail mix (no chocolate) ____		Salt substitute ____	
Lean or extra lean ground meat ____		Brown rice ____		Low sugar pudding packs ____		Nuts ____		Cooking Spray ____	
Lean poultry ____		Lean deli meat ____		Baked chips ____		Graham crackers ____		Liquid oils ____	
Eggs ____		Canned vegetables ____		Pretzels ____ Low sodium Y/N		Low sugar/low fat granola bars ____		Light dressing ____	
Fresh/pre-packaged sandwiches ____		Frozen vegetables ____		Breakfast/Infant Foods		High fiber cereals ____		Low sugar cereal ____	
Low or reduced fat cheese (block/sliced) ____		Peanut butter ____		Infant formula ____		Infant cereal (box) ____		Infant Vegetables and Fruit ____	
								Oatmeal ____	
								100% fruit juice (unsweet.) ____	
								Diet/ unsweet. ice tea ____	
								Low sugar flavored water ____	
								Low sugar drink mix (crystal light) ____	

Tobacco Products			
Availability (Y/N)	Located Behind Counter (Y/N)	Advertising (Promotion, Discount, etc.) (Y/N)	Location of Advertising (Y/N)
Cigarettes____	Cigarettes____	Cigarettes____	Behind the counter____
Cigars____	Cigars____	Cigars/Small Cigars/Cigarillos____	In front of counter____
Small Cigars/Cigarillos (single)____	Small Cigars/Cigarillos (single)____	Smokeless/Chewing____	Store window____
Small Cigars/Cigarillos (packs)____	Small Cigars/Cigarillos (packs)____	Snus____	Other____ If other, describe____
Smokeless/Chewing____	Smokeless/Chewing____	Smoking Cessation Products (Y/N)	
Snus____	Snus____	Availability____	Located with Tobacco Products____

WIC Guidelines and Definitions

Low-fat	<10% of daily value of fat per serving (on label)
Low sugar	<10g of daily value of sugar per serving (on label)
High fiber	<10% of daily value of fiber per serving (on label)
Fresh fruit and vegetables	Does not include potatoes, salad bar items, or dried fruit
Frozen vegetables	Does not include breaded vegetables or those with sugar, sauce, fat, oil, or meat
Canned vegetables	Does not include potatoes, meat, fat, oil, rice, or pasta
Beans/peas (blackeye, split, lentil)	Does not include green, wax, or sweet peas, soup, or beans with sauce, meat, fat or oil
Whole wheat bread	Cannot include raisins or nuts; cannot be pita, bagels or English Muffin
Infant vegetables and fruit	Cannot include meat

Appendix D: Customer Survey

Respondent ID: _____



Approved: February 20, 2014 IRB No.: 4421

MARYLAND HEALTHY STORES 2 Customer Impact Questionnaire

Data checked by:
Date of checking:
Data entered by:
Date of entry:
Form ID:
Participant ID:

Interviewer Name: _____

Date: ____/____/____ Interview start time: ____:____AM/PM
MM DD YY

Resp. Name: _____

Resp. Address: _____

Phone Numbers: #1 _____ #2 _____

Email address _____

1. Sex (circle one) Male Female

2. Birth Month/Year: ____/____ (MM/YY)

Signed consent obtained: Yes ____ No ____

Interview Checklist

"I am going to ask you questions about your food habits. Before we begin, I want to give you some important information about your participation in this survey."

1. All information collected will not be shared with anyone not involved with our research study. ____
2. There are no right or wrong answers. ____
3. If you need any of the questions or answer choices to be repeated, please ask me and I will be happy to help you. ____
4. The information you give will help individuals who live in Maryland, and are at-risk of diabetes and heart disease so please be as honest as you can be. ____
5. Thank you so much for your help. ____

(REMOVE THIS FIRST PAGE AND STORE SEPARATELY)

PI: Dr. Gittelsohn, MHS2 - IRB # 00004421, Version 2, 1/13/14

1

Respondent ID: _____

Section 1 – Small Store Purchasing Behaviors

1. Location survey conducted
 - a. Store (Name: _____)
 - b. Health Department (Name: _____)
 - c. Restaurant (Name: _____)
 - d. Private Home
 - e. Health Clinic
 - f. Community Center
 - g. Other (Specify: _____)
2. County location:
 - a. Caroline
 - b. Dorchester
 - c. Garrett
 - d. Kent
 - e. St. Mary's
 - f. Talbot
 - g. Worcester
3. What is the main reason you shop at this small store? (choose/write 1st, 2nd, 3rd reason)
☐ Better quality of foods
☐ Taste of foods
☐ Cleanliness
☐ Good service
☐ Convenience (Close to home/workplace, accessible by public transportation)
☐ Lower Cost
☐ Other reasons (specify: _____)
4. How often did you come to this store in the last 30 days? _____times
5. How often did you go to other small stores in the last 30 days? _____times
6. Approximately how much did you spend on items for yourself per visit to this store? _____dollars
7. What do you usually buy at this store? (Circle all that apply)
 - a. Gasoline
 - b. Tobacco products - What type: (i.e., cigarillos, smokeless) _____
 - c. Alcohol
 - d. Lottery
 - e. Snacks
 - f. Drinks
 - g. Other: (Please specify: _____)

Respondent ID: _____

Section 2 – Small store purchasing of non-prepared foods

Now I want to get an idea of how often you buy some foods. Please think back over the last 30 days. I'm going to name foods and I want you to tell me how often you purchased those foods in the last 30 days (4weeks). You may have purchased these foods by buying, using food stamps or WIC.

In the last 30 days, how many times have you bought the following foods for yourself at any store?

In the last 30 DAYS, how many times did you get these foods?	# of times
Dairy Products	-----
8. Whole Milk (or Lactaid)	
9. 2% Milk (or Lactaid)	
10. 1% or skim milk (or Lactaid)	
Beverages	-----
11. Regular soda or regular energy drinks	
12. Diet soda or diet energy drinks (include Coke Zero, Sprite Zero, etc.)	
13. Fruit drinks, vitamin water, sports drinks, cocktail, lemonade	
14. Water	
15. 100% Fruit Juice (Brand: _____)	
16. Sugar free drinks or drink mixes (Crystal Light, Wyler's Light)	
Fruit and Vegetables	-----
17. Fresh Fruit (Types: _____)	
18. Frozen Fruit: (Types: _____)	
19. Canned fruit (or fruit cup) in fruit juice (peaches, pears, mixed)	
20. Canned fruit (or fruit cup) in syrup (light or heavy)	
21. Fresh Vegetables (exclude regular potatoes) (Types: _____)	
22. Frozen Vegetables	
23. Canned Vegetables, low sodium	
24. Canned Vegetables	
Meats	-----
25. Beans, dried or canned, no salt or sugar	
26. Baked beans, pork and beans or beans with salt added	
Snacks	-----
27. Chips (Potato chips, Doritos, Tortilla chips, Cheese curls)	
28. Pretzels, low sodium	
29. Baked Chips (Type(s): _____)	
30. Cookie, Cake or Danish (ex. Honey bun, Tastycake)	

PI: Dr. Gittelsohn, MHS2 - IRB # 00004421, Version 2, 1/13/14

Respondent ID: _____

31. Granola Bar or cereal bar	
32. Candy (candy bars, chocolates, Skittles, Gummy bears, etc.)	
33. Dried fruit, nuts, or seeds (like sun flower seeds)	
Condiments & others	-----
34. Butter, margarine or shortening	
35. Oil (e.g. vegetable, olive, canola)	
36. Reduced fat butter or margarine	
37. Cooking spray	
38. Mayonnaise	
39. Lite Mayonnaise/Miracle Whip	

Section 3 – Psychosocial Factors

Food-related Knowledge

For the next set of questions please pick the answer that you think answers the question best. If you're not sure of the answer, just give me your best guess. (Do not read answer choice D. Only mark it if respondent elicitly states that he/she does not know. Make sure survey is not in respondent's view for this reason)

40. Which of the following adds the least amount of fat?
- Vegetable oil ☐
 - Shortening..... ☐
 - Cooking spray ☐
 - Don't know ☐
41. Which of the following do you think is the lowest fat option to choose from a carry-out menu?
- Burger with French fries..... ☐
 - Chef Salad with Blue Cheese dressing.. ☐
 - Grilled chicken with baked potato ☐
 - Don't know ☐
42. Which milk (or Lactaid) is lowest in fat?
- Whole milk ☐
 - Skim milk or 1% milk.. ☐
 - 2% Milk ☐
 - Don't know ☐
43. Which of the following drinks has the least amount of calories?
- Crystal Light ☐
 - Regular Pepsi ☐
 - 100% Juice ☐
 - Don't Know ☐

Respondent ID: _____

44. Which of the following do you think is the largest source of sodium (salt) in the American diet?

- Salt added at table ☐
- Salt in home cooking ☐
- Salt in processed & restaurant foods.....☐
- Don't know.....☐

45. Why is trans-fat bad for your heart?

- It raises LDL-cholesterol ("bad" cholesterol) ☐
- It reduces HDL-cholesterol ("good" cholesterol).....☐
- Both☐
- Don't know.....☐

Food-related Self-efficacy

I am now going to list some food related activities. I would like you to tell me how easy or difficult it would be for you to do each activity in your daily life as it is right now by choosing one of these answers : would be very easy, somewhat difficult, very difficult or impossible to do regularly. For each question,

please choose one of these answer choices. (Give respondent supplement with answer choices)

46. How easy or difficult would it be for you to regularly use cooking spray (like Pam) instead of oil, shortening, or butter when preparing meals?

- Very easy☐
- Somewhat difficult☐
- Very difficult.....☐
- Would be impossible.....☐

47. How easy or difficult would it be for you regularly read the nutrition facts on food labels to decide what foods to purchase for the household?

- Very easy☐
- Somewhat difficult☐
- Very difficult.....☐
- Would be impossible.....☐

48. How easy or difficult would it be for you regularly buy baked chips or pretzels instead of regular chips as a snack for the household?

- Very easy☐
- Somewhat difficult☐
- Very difficult.....☐
- Would be impossible.....☐

49. How easy or difficult would it be for you regularly have fruits or vegetables as a snack?

- Very easy.....☐
- Somewhat difficult.....☐
- Very difficult.....☐
- Would be impossible.....☐

Respondent ID: _____

Behavioral intentions on food related behaviors

I am now going to ask you questions about how you prepare foods and how you choose which foods to purchase. For each question I will give you three choices; please tell me which of the three options you would do.

50. The next time you fried eggs for the household, what would you use to fry them?

- Cooking spray.....☐
Vegetable oil.....☐
Vegetable shortening, margarine, butter, or lard..... ☐

51. The next time you buy milk, which would you choose (include Lactaid)?

- Regular, whole milk....☐
2% milk.....☐
1% or skim milk.....☐

52. The next time you want to buy a salty snack, which would you choose?

- Regular Potato chips..☐
Baked chips.....☐
Pretzels.....☐

53. The next time you are thirsty, which would you choose?

- Regular soda.....☐
Lite or diet beverage..☐
Water.....☐

Section 4 – Tobacco related purchasing and knowledge questions

54. When was the last time you used tobacco products (e.g., cigarettes, cigars, cigarillos, smokeless)?

- a. I have never used tobacco products
b. During the past 30 days
c. Not during the past 30 days but sometime during the past year
d. More than 1 year ago

55. Have you used an electronic smoking device (e.g., e-cigarette, e-cigar, e-hookah)?

- a. I have never used an electronic smoking device
b. Yes, during the past 30 days (go to Q. 2)
c. No, not during the past 30 days but sometime during the past year (go to Q. 2)
d. Yes, more than 1 year ago (go to Q. 2)

56. Are you using an electronic smoking device to help you quit smoking?

- a. Yes
b. No
c. No I am not currently using, but am considering it

Respondent ID: _____

57. Do you think it's legal to sell fruit and candy flavored tobacco products?
- a. Yes
 - b. No
 - c. Don't Know
58. Maryland high school youth (< 18yrs) smoke cigarettes and cigars at similar rates.
- a. True
 - b. False
 - c. Don't Know
59. Which of the following offer smoking cessation services/resources?
- a. Local Health Departments
 - b. Maryland Tobacco Quitline (1-800-Quit-Now)
 - c. Hospitals
 - d. Health Clinics/Doctors' Offices
 - e. All of the above
 - f. Don't Know

Section 5 - Demographics

60. What is the highest level of education that you have achieved?
- a. Less than 6th grade
 - b. 6th grade
 - c. 7th grade
 - d. 8th grade
 - e. High School Diploma/GED
 - f. Technical/ vocational training
 - g. Some college
 - h. Associate's degree
 - i. Bachelor's degree
 - j. Graduate school
61. Are you currently employed?
- a. Yes
 - b. No
 - c. Retired
 - d. Disability
62. IF YES ABOVE: Are you employed... (circle all that apply)
- a. Full time
 - b. Part time
 - c. Seasonal/occasional
 - d. Temporary

Respondent ID: _____

To the best of your knowledge, what is your current height and weight?

63. Height ____ ft. ____ inches

64. Weight _____ lbs

Now Perform the National Cancer Institute Fruit and Vegetable Screener here

Now Perform the National Cancer Institute Fat Screener here

Respondent ID: _____

Time Interview Ended: _____:_____ AM/PM

"Thank you, we are VERY grateful for your help!"

INTERVIEWER ASSESSMENT

How was the quality of the survey? Good (1) Fair (2) Poor (3) Not useable
(4)

Any comments?

I have checked this questionnaire for completeness and that it is properly filled out.

Interviewer Signature: _____

Date: _____

Respondent ID: _____

MARYLAND HEALTHY STORES (MHS2) GIFT CARD RECEIPT

I received a \$_____gift card (s)
(# _____)

From data collector (Name: _____)

As compensation for completing this interview.

Interview Date: ____/____/____
 MM DD YY

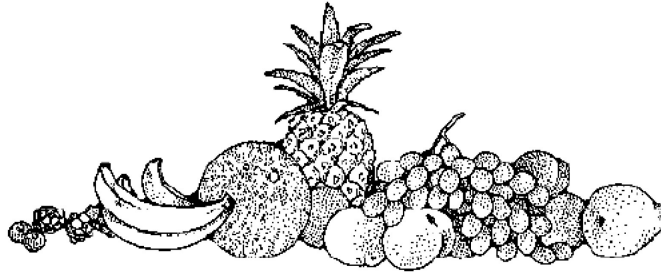
Signature of Person Receiving Gift Card:

Printed Name of Person Receiving Gift Card:

Appendix E: Fruit and Vegetable Intake Instrument

OMB# 0925-0450 EXP. DATE: 07/31/2000

NATIONAL INSTITUTES OF HEALTH EATING AT AMERICA'S TABLE STUDY QUICK FOOD SCAN



- The person who completed the telephone interviews for the Eating at America's Table Study should fill out this questionnaire.
- Use only a No. 2 pencil.
- Be certain to completely blacken in each of the answers, and erase completely if you make any changes.
- Do not make any stray marks on this form.
- When you complete this questionnaire, please return it in the postage-paid envelope to:

National Cancer Institute
EPN, Room 313
6130 Executive Blvd., MSC 7344
Bethesda, MD 20892-7344

BAR
CODE
LABEL
HERE

NOTIFICATION TO RESPONDENT OF ESTIMATED BURDEN

Public reporting burden for this collection of information is estimated to average 15 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to: NIH, Project Clearance Office, 6701 Rockledge Drive, MSC 7730, Bethesda, MD 20892-7730, ATTN: PRA (0925-0450). Do not return the completed form to this address.

PLEASE DO NOT WRITE IN THIS AREA



SERIAL

INSTRUCTIONS

- Think about what you usually ate last month.
- Please think about **all** the fruits and vegetables that you ate last month. Include those that were:
 - raw and cooked,
 - eaten as snacks and at meals,
 - eaten at home and away from home (restaurants, friends, take-out), and
 - eaten alone and mixed with other foods.
- Report how many times per month, week, or day you ate each food, and if you ate it, how much you usually had.
- If you mark "Never" for a question, follow the "Go to" instruction.
- Choose the best answer for each question. Mark only one response for each question.

1. Over the last month, how many times per month, week, or day did you drink **100% juice** such as orange, apple, grape, or grapefruit juice? **Do not count** fruit drinks like Kool-Aid, lemonade, Hi-C, cranberry juice drink, Tang, and Twister. Include juice you drank at all mealtimes and between meals.

☐ Never
(Go to
Question 2)
 ☐ 1-3
times
last month
 ☐ 1-2
times
per week
 ☐ 3-4
times
per week
 ☐ 5-6
times
per week
 ☐ 1
time
per day
 ☐ 2
times
per day
 ☐ 3
times
per day
 ☐ 4
times
per day
 ☐ 5 or more
times
per day

- 1a. Each time you drank **100% juice**, how much did you usually drink?

☐ Less than ¼ cup
(less than 6 ounces)
 ☐ ¼ to 1¼ cup
(6 to 10 ounces)
 ☐ 1¼ to 2 cups
(10 to 16 ounces)
 ☐ More than 2 cups
(more than 16 ounces)

2. Over the last month, how many times per month, week, or day did you eat **fruit**? Count any kind of fruit—fresh, canned, and frozen. **Do not count** juices. Include fruit you ate at all mealtimes and for snacks.

☐ Never
(Go to
Question 3)
 ☐ 1-3
times
last month
 ☐ 1-2
times
per week
 ☐ 3-4
times
per week
 ☐ 5-6
times
per week
 ☐ 1
time
per day
 ☐ 2
times
per day
 ☐ 3
times
per day
 ☐ 4
times
per day
 ☐ 5 or more
times
per day

- 2a. Each time you ate **fruit**, how much did you usually eat?

☐ Less than 1 medium fruit
 ☐ 1 medium fruit
 ☐ 2 medium fruits
 ☐ More than 2 medium fruits

OR

☐ Less than ½ cup
 ☐ About ½ cup
 ☐ About 1 cup
 ☐ More than 1 cup

3. Over the last month, how often did you eat **lettuce salad (with or without other vegetables)**?

☐ Never
(Go to Question 4)
 ☐ 1-3 times last month
 ☐ 1-2 times per week
 ☐ 3-4 times per week
 ☐ 5-6 times per week
 ☐ 1 time per day
 ☐ 2 times per day
 ☐ 3 times per day
 ☐ 4 times per day
 ☐ 5 or more times per day

3a. Each time you ate **lettuce salad**, how much did you usually eat?

☐ About 1/4 cup
 ☐ About 1 cup
 ☐ About 2 cups
 ☐ More than 2 cups

4. Over the last month, how often did you eat **French fries or fried potatoes**?

☐ Never
(Go to Question 5)
 ☐ 1-3 times last month
 ☐ 1-2 times per week
 ☐ 3-4 times per week
 ☐ 5-6 times per week
 ☐ 1 time per day
 ☐ 2 times per day
 ☐ 3 times per day
 ☐ 4 times per day
 ☐ 5 or more times per day

4a. Each time you ate **French fries or fried potatoes**, how much did you usually eat?

☐ Small order or less
(About 1 cup or less)
 ☐ Medium order
(About 1 1/2 cups)
 ☐ Large order
(About 2 cups)
 ☐ Super Size order or more
(About 3 cups or more)

5. Over the last month, how often did you eat **other white potatoes**? Count **baked, boiled, and mashed potatoes, potato salad, and white potatoes that were not fried**.

☐ Never
(Go to Question 6)
 ☐ 1-3 times last month
 ☐ 1-2 times per week
 ☐ 3-4 times per week
 ☐ 5-6 times per week
 ☐ 1 time per day
 ☐ 2 times per day
 ☐ 3 times per day
 ☐ 4 times per day
 ☐ 5 or more times per day

5a. Each time you ate **these potatoes**, how much did you usually eat?

☐ 1 small potato or less
(1/2 cup or less)
 ☐ 1 medium potato
(1/2 to 1 cup)
 ☐ 1 large potato
(1 to 1 1/2 cups)
 ☐ 2 medium potatoes or more
(1 1/2 cups or more)

6. Over the last month, how often did you eat **cooked dried beans**? Count **baked beans, bean soup, refried beans, pork and beans and other bean dishes**.

☐ Never
(Go to Question 7)
 ☐ 1-3 times last month
 ☐ 1-2 times per week
 ☐ 3-4 times per week
 ☐ 5-6 times per week
 ☐ 1 time per day
 ☐ 2 times per day
 ☐ 3 times per day
 ☐ 4 times per day
 ☐ 5 or more times per day

6a. Each time you ate **these beans**, how much did you usually eat?

☐ Less than 1/4 cup
 ☐ 1/4 to 1 cup
 ☐ 1 to 1 1/2 cups
 ☐ More than 1 1/2 cups

7. Over the last month, how often did you eat **other vegetables**?

- DO NOT COUNT:**
- Lettuce salads
 - White potatoes
 - Cooked dried beans
 - Vegetables in mixtures, such as in sandwiches, omelets, casseroles, Mexican dishes, stews, stir-fry, soups, etc.
 - Rice

COUNT: • All other vegetables—raw, cooked, canned, and frozen

☐ Never
(Go to
Question 8)

☐ 1-3
times
last month

☐ 1-2
times
per week

☐ 3-4
times
per week

☐ 5-6
times
per week

☐ 1
time
per day

☐ 2
times
per day

☐ 3
times
per day

☐ 4
times
per day

☐ 5 or more
times
per day

7a. Each of these times that you ate **other vegetables**, how much did you usually eat?

☐ Less than ½ cup

☐ ½ to 1 cup

☐ 1 to 2 cups

☐ More than 2 cups

8. Over the last month, how often did you eat **tomato sauce**? Include tomato sauce on pasta or macaroni, rice, pizza and other dishes.

☐ Never
(Go to
Question 9)

☐ 1-3
times
last month

☐ 1-2
times
per week

☐ 3-4
times
per week

☐ 5-6
times
per week

☐ 1
time
per day

☐ 2
times
per day

☐ 3
times
per day

☐ 4
times
per day

☐ 5 or more
times
per day

8a. Each time you ate **tomato sauce**, how much did you usually eat?

☐ About ¼ cup

☐ About ½ cup

☐ About 1 cup

☐ More than 1 cup

9. Over the last month, how often did you eat **vegetable soups**? Include tomato soup, gazpacho, beef with vegetable soup, minestrone soup, and other soups made with vegetables.

☐ Never
(Go to
Question 10)

☐ 1-3
times
last month

☐ 1-2
times
per week

☐ 3-4
times
per week

☐ 5-6
times
per week

☐ 1
time
per day

☐ 2
times
per day

☐ 3
times
per day

☐ 4
times
per day

☐ 5 or more
times
per day

9a. Each time you ate **vegetable soup**, how much did you usually eat?

☐ Less than 1 cup

☐ 1 to 2 cups

☐ 2 to 3 cups

☐ More than 3 cups

10. Over the last month, how often did you eat **mixtures that included vegetables**? Count such foods as sandwiches, casseroles, stews, stir-fry, omelets, and tacos.

☐ Never

☐ 1-3
times
last month

☐ 1-2
times
per week

☐ 3-4
times
per week

☐ 5-6
times
per week

☐ 1
time
per day

☐ 2
times
per day

☐ 3
times
per day

☐ 4
times
per day

☐ 5 or more
times
per day

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Thank you very much for completing this questionnaire.
Please return it in the enclosed, postage-paid envelope or to the
address listed on the front page.

Appendix F: Dietary Fat Intake Instrument

ID # Place Label Here

NATIONAL CANCER INSTITUTE QUICK FOOD SCAN

1. Think about your eating habits over the past 12 months. About how often did you eat or drink each of the following foods? Remember breakfast, lunch, dinner, snacks, and eating out. Blacken in only one bubble for each food.

TYPE OF FOOD	Never	Less than Once Per Month	1-3 Times Per Month	1-2 Times Per Week	3-4 Times Per Week	5-6 Times Per Week	1 Time Per Day	2 or More Times Per Day
Cold cereal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Skim milk, on cereal or to drink	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Eggs, fried or scrambled in margarine, butter, or oil	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sausage or bacon, regular-fat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Margarine or butter on bread, rolls, pancakes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Orange juice or grapefruit juice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fruit (not juices)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Beef or pork hot dogs, regular-fat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cheese or cheese spread, regular-fat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
French fries, home fries, or hash brown potatoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Margarine or butter on vegetables, including potatoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mayonnaise, regular-fat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Salad dressings, regular-fat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Margarine, butter, or oil on rice or pasta	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2. Over the past 12 months, when you prepared foods with margarine or ate margarine, how often did you use a reduced-fat margarine?

☐ DIDN'T USE MARGARINE
 ☐ Almost never
 ☐ About 1/4 of the time
 ☐ About 1/2 of the time
 ☐ About 3/4 of the time
 ☐ Almost always or always


3. Overall, when you think about the foods you ate over the past 12 months, would you say your diet was high, medium, or low in fat?

☐ High
 ☐ Medium
 ☐ Low

scan1 6/15/00

Appendix G-I: Informed Consent Forms

Appendix G: Informed Consent Form for Interviews with Store Owners

	Approval Date: August 16, 2012 Approved Consent Version No.: 1 PI Name: Joel Gittelsohn IRB No. 00004421
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JOHNS HOPKINS BLOOMBERG SCHOOL OF PUBLIC HEALTH

INFORMED CONSENT DOCUMENT

CONSENT FORM B FOR SEMI-STRUCTURED STORE OWNER INTERVIEW

Study Title: Maryland Healthy Stores – phase 2 (MHS-2): A Rural Food Store Intervention to Change the Food Environment and Reduce Obesity Risk in Rural Maryland Counties

Principal Investigator: Dr. Joel Gittelsohn, Ph.D

IRB No.: 00004421

PI Version Date: 7/11/12

What you should know about this study

- You are being asked to join a research study.
- This consent form explains the research study and your part in the study.
- Please read it carefully and take as much time as you need.
- You are a volunteer. You can choose not to take part and if you join, you may quit at any time. There will be no penalty if you decide to quit the study.
- During the study, we will tell you if we learn any new information that might affect whether you wish to continue to be in the study.

Purpose of research project

Maryland Healthy Stores is a Johns Hopkins School of Public Health study that involves research. It aims to prevent some of the common health problems in Maryland, like obesity, heart disease, diabetes and high blood pressure. We are doing this by working with the Maryland Department of Health and Mental Hygiene, your county health department, local food stores, and other community organizations to improve the availability of healthy foods, and promote those foods within stores.

Why you are being asked to participate

In order to plan this program, we are talking with food store staff, health officials, community leaders, and food store customers. You were chosen to participate in this study because you are the manager/owner of a food store in this community.

Procedures

If you agree to participate, we will do the interview with you in a private place that is convenient for you (i.e. stores, homes, community organizations, county health department) at a time that is most easy for you. The interview will take about 45 minutes. We will ask you about the foods you stock and sell at your store, the foods you think you can sell, and your opinions about how to sell healthy foods.

PI: Dr. Gittelsohn, MHS2 - IRB # 00004421, Version 1, 10-22-12



Approval Date: August 16, 2012
Approved Consent Version No.: 1
PI Name: Joel Gittelsohn
IRB No. 00004421

Risks/discomforts

We have tried our best to leave out sensitive questions/issues. However, if any questions make you uncomfortable, please tell us, and we can move to the next question or stop the interview. Your participation is voluntary and if for any reason you wish to stop the interview, you can. You can refuse to participate or discontinue participation at anytime without penalty.

There are minimal risks if you participate in this project. You may be uncomfortable to discuss your food preferences and diet. Another possible risk would be if other people found out the information you share. However, all interviewers are trained to keep your information confidential.

Benefits

Your participation in this study will not directly benefit you. The information we collect will be used to develop a program to help improve the diet of people in your community and reduce their risk of diabetes, heart disease, and obesity.

Payment

You will receive a \$20 gift card to a store at the end of the interview. You will receive the gift card even if you do not complete the interview. Do you have any questions?

Protecting data confidentiality

We will be digitally recording and taking notes during the interview. These recordings and notes will only be accessible to people who work on this project. The digital recordings will be erased within a year after they are transcribed. All documents with your name on it will be locked in a separate filing cabinet that can only be accessed by people who work on this project. Your name will not be mentioned in any reports we prepare.

If you do have any additional questions about your participation in this study, please feel free to contact the Principal Investigator, Dr. Joel Gittelsohn, (410-955-3927 or jgittels@jhsph.edu), or the Johns Hopkins Committee Institutional Review Board (1-888-262-3242 or irboffice@jhsph.edu).

Address: Johns Hopkins Bloomberg School of Public Health
615 N. Wolfe Street, Suite E1100
Baltimore, MD 21205
Telephone: 410-955-3193
Toll Free: 1-888-262-3242
Fax: 410-502-0584
E-mail: irboffice@jhsph.edu



Approval Date: August 16, 2012
Approved Consent Version No.: 1
PI Name: Joel Gittelsohn
IRB No. 00004421

What does your signature on this consent form mean?

Your signature on this form means:

- You have been informed about this study's purpose, procedures, possible benefits and risks.
- You have been given the chance to ask questions before you sign.
- You have voluntarily agreed to be in this study.

Print name of Adult Participant

Signature of Adult Participant

Date


Print name of Person Obtaining
Consent

Signature of Person Obtaining Consent

Date

Give one copy to the participant and keep one copy in study records

Appendix H: Informed Consent Form for Interviews with Customers

	Approval Date: August 16, 2012 Approved Consent Version No.: 1 PI Name: Joel Gittelsohn IRB No. 00004421
---	---

JOHNS HOPKINS BLOOMBERG SCHOOL OF PUBLIC HEALTH

INFORMED CONSENT DOCUMENT

CONSENT FORM A FOR STORE CUSTOMER INTERVIEW

Study Title: Maryland Healthy Stores – phase 2 (MHS-2): A Rural Food Store Intervention to Change the Food Environment and Reduce Obesity Risk in Rural Maryland Counties

Principal Investigator: Dr. Joel Gittelsohn, Ph.D

IRB No.: 00004421

PI Version Date: 7/11/12

What you should know about this study

- You are being asked to join a research study.
- This consent form explains the research study and your part in the study.
- Please read it carefully and take as much time as you need.
- You are a volunteer. You can choose not to take part and if you join, you may quit at any time. There will be no penalty if you decide to quit the study.
- During the study, we will tell you if we learn any new information that might affect whether you wish to continue to be in the study.

Purpose of research project

Maryland Healthy Stores is a Johns Hopkins School of Public Health study that involves research. It aims to prevent some of the common health problems in Maryland counties, like obesity, heart disease, diabetes and high blood pressure. We are doing this by working with the Maryland Department of Health and Mental Hygiene, your county health department, local food stores, and other community organizations to improve the availability of healthy foods, and promote those foods within stores.

Why you are being asked to participate

In order to plan this program, we are talking with food store staff, health officials, community leaders, and food store customers. You were chosen to participate in this study because you shop at a local food store in the community.

Procedures

If you agree to participate, we will do the interview with you in a location that is convenient for you (i.e. stores, homes, community organizations, county health department) at a time that is most easy for you. The interview will take about 45 minutes. We will ask you about your food purchasing habits, food preferences, and reasons for buying food at one source over another.

PI: Dr. Gittelsohn, MHS2 - IRB # 00004421, Version 1, 10-22-12



Approval Date: August 16, 2012
Approved Consent Version No.: 1
PI Name: Joel Gittelsohn
IRB No. 00004421

We will also ask you about your perceptions about the foods provided at stores in your community, and what you think could be done to improve those stores to make a healthier environment.

Risks/discomforts

We have tried our best to leave out sensitive questions/issues. However, if any questions make you uncomfortable, please tell us, and we can move to the next question or stop the interview. Your participation is voluntary and if for any reason you wish to stop the interview, you can. You can refuse to participate or discontinue participation at anytime without penalty.

There are minimal risks if you participate in this project. You may be uncomfortable to discuss your food preferences and diet. Another possible risk would be if other people found out the information you share. However, all interviewers are trained to keep your information confidential.

Benefits

Your participation in this study will not directly benefit you. The information we collect will be used to develop a program to help improve the diet of people in your community and reduce their risk of diabetes, heart disease, and obesity.

Payment

You will receive a \$20 gift card to a store at the end of the interview. You will receive the gift card even if you do not complete the interview. Do you have any questions?

Protecting data confidentiality

We will be digitally recording and taking notes during the interview. These recordings and notes will only be accessible to people who work on this project. The digital recordings will be erased within a year after they are transcribed. All documents with your name on it will be locked in a separate filing cabinet that can only be accessed by people who work on this project. Your name will not be mentioned in any reports we prepare.

If you do have any additional questions about your participation in this study, please feel free to contact the Principal Investigator, Dr. Joel Gittelsohn, (410-955-3927 or jgittels@jhsph.edu), or the Johns Hopkins Committee Institutional Review Board (1-888-262-3242 or irboffice@jhsph.edu).

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PI: Dr. Gittelsohn, MHS2 - IRB # 00004421, Version 1, 10-22-12



Approval Date: August 16, 2012
Approved Consent Version No.: 1
PI Name: Joel Gittelsohn
IRB No. 00004421

What does your signature on this consent form mean?

Your signature on this form means:

- You have been informed about this study's purpose, procedures, possible benefits and risks.
- You have been given the chance to ask questions before you sign.
- You have voluntarily agreed to be in this study.

Print name of Adult Participant

Signature of Adult Participant

Date

Print name of Person Obtaining
Consent

Signature of Person Obtaining Consent

Date

Give one copy to the participant and keep one copy in study records

JOHNS HOPKINS BLOOMBERG SCHOOL OF PUBLIC HEALTH

INFORMED CONSENT DOCUMENT

CONSENT FORM E FOR CUSTOMER SURVEY

Study Title: [Maryland Healthy Stores – Phase 2 \(MHS-2\): A Rural Food Store Intervention to Change the Food Environment and Reduce Obesity Risk in Rural Maryland Counties](#)

Principal Investigator: Dr. Joel Gittelsohn, Ph.D

IRB No.: 00004421

PI Version Date: 1/20/14

What you should know about this study

- You are being asked to join a research study.
- This consent form explains the research study and your part in the study.
- Please read it carefully and take as much time as you need.
- You are a volunteer. You can choose not to take part and if you join, you may quit at any time. There will be no penalty if you decide to quit the study.
- During the study, we will tell you if we learn any new information that might affect whether you wish to continue to be in the study.

Purpose of research project

Maryland Healthy Stores is a Johns Hopkins School of Public Health study that involves research. It aims to prevent some of the common health problems in the rural counties of Maryland, like obesity, heart disease, diabetes and high blood pressure. We are doing this

by working with the Maryland Department of Health and Mental Hygiene, your county health department, local food stores, and other community organizations to improve the availability of healthy foods, and promote those foods within stores.

Why you are being asked to participate

In order to plan this program, we are talking with food store staff, health officials, community leaders, and food store customers. You were chosen to participate in this study because you shop at a local food store in the community.

Procedures

If you agree to participate, we will do two surveys with you in a quiet place in the store at times that are most easy for you. The first survey will happen now, the second in about 9-12 months. Each survey will take about 30-40 minutes. We will ask you about some of the foods you buy at your store and consume; there will also be several questions on tobacco use and purchasing questions

Risks/discomforts

We have tried our best to leave out sensitive questions/issues. However, if any questions make you uncomfortable, please tell us, and we can move to the next question or stop the interview. Your participation is voluntary and if for any reason you wish to stop the interview, you can. You can refuse to participate or discontinue participation at anytime without penalty.

There are minimal risks if you participate in this project. You may be uncomfortable to discuss your food preferences and diet. Another possible risk would be if other people found out the information you share. However, all interviewers are trained to keep your information confidential.

Benefits

Your participation in this study will not directly benefit you. The information we collect will be used to develop a program to help improve the diet of people in your community and reduce their risk of diabetes, heart disease, and obesity.

Payment

You will receive a \$20 gift card to a store at the end of each interview. You will receive the gift card even if you do not complete the interview. Do you have any questions?

Protecting data confidentiality

We will be digitally recording and taking notes during the interview. These recordings and notes will only be accessible to people who work on this project. The digital recordings will be erased within a year after they are transcribed. All documents with your name on it will be locked in a separate filing cabinet that can only be accessed by people who work on this project. Your name will not be mentioned in any reports we prepare.

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- You have voluntarily agreed to be in this study.

Print name of Adult Participant

Signature of Adult Participant

Date

Print name of Person Obtaining

Signature of Person Obtaining Consent

Date

Consent

Give one copy to the participant and keep one copy in study records

Appendix J: Codebooks

Table J.1 Codebook for Interviews with Small Store Customers	
Code	Description
Food Source	Places food was acquired.
Frequency SSV	Frequency of small store visits.
Large Store Visits	Frequency of large store visits.
Foods Purchased Regularly: Large Store	Foods regularly purchased at large stores.
Foods Purchased Regularly: Small Store	Foods regularly purchased at small stores.
Price	Influence of price on food shopping.
Fat	Fat knowledge and influence on food choice.
Sodium	Sodium knowledge and influence on food choice.
Healthy Food	Foods and terms named as healthy.
Healthy Foods Purchases	Foods purchased that respondent considered healthy.
How They Decide to Buy Healthy Food	Health and nutrition information that impacts healthy food purchasing.
Ways to shop for healthy food	All barriers and facilitators to healthy food purchasing.
Barriers to healthy food purchasing	Barriers to healthy food purchasing.
Facilitators to healthy food purchasing	Facilitators to healthy food purchasing.
Food purchasing decisions: small store ->	Foods the respondent would or would not purchase in a small store and why.
Buy New Product Small Store	Influences to purchasing new products at small stores.
Not Buy Product Small Store	Reasons the respondent would not try new products at a small store.
Foods Desired Small Store	Healthy foods the respondent would like the small store to stock.
Nutrition knowledge	The impact of nutrition knowledge on food purchasing.
Nutrition Food Promotion	Nutrition information the respondent has noticed at any retail food store.
Intervention Communications	Ideas the respondent has for methods of promoting a healthy food intervention in the small store.

Table J.2 Codebook for Interviews with Small Store Owners	
Code	Description
About store	Details about the store including history, location, and customer base.
Popular items at store	All popular items sold at the store including non-food items.
List Popular Foods	Popular foods and beverages sold in the store.
Healthy Food	Foods the respondent considers healthy.
Healthy Foods Stocked	Foods the respondent considers healthy among foods that they stock.
Healthy foods sales	Popular items among the healthy foods stocked.
Barriers to healthy food stocking	Barriers the respondent has encountered to healthy food stocking.
Wholesalers and distributors	The respondents' relationships with wholesalers and distributors.
Foods not carried by wholesaler or distributor	The foods that the wholesalers and distributors do not carry that the respondent would like to stock.
Ordering/Shopping	The ordering and/or shopping procedures for stock.
Frequency Ordering/Shopping	Frequency of ordering and/or shopping for stock.
Wholesale Promotions	Promotions offered by wholesalers.
Customer relations	Details on relationships with customers.
Business to business relations and stocking	Details on relationships with other store owners.
Effect of competition	How competition effects the store operations of the respondent.
Desired foods to stock	Foods that the store owner would like to introduce to their store.
Price determination factors	How price is set in the store.
Impact of customer purchasing	How customer purchasing effects price and stocking.
Promotions	Perspectives on in-store promotions of products.
Fats	Knowledge of trans fats and perspectives of customer concerns.
Sodium	Knowledge of sodium and perspectives of customer concerns.
Messages/materials for promotions	Messages and/or materials store owners use for promotions.
Small store displays	How product display in the store is determined.

Appendix K: North American Industry Classification System (NAICS) Code Details

Codes, Code Descriptions, and Code Definitions for Types of Small Stores Included in the Study

Table 9.1 NAICS Code Details for Stores Included in the Study		
NAICS Code	NAICS Code Description	NAICS Code Definition
445310	Beer, Wine, and Liquor Stores	This industry comprises establishments primarily engaged in retailing packaged alcoholic beverages, such as ale, beer, wine, and liquor.
445120	Convenience Stores	This industry comprises establishments known as convenience stores or food marts (except those with fuel pumps) primarily engaged in retailing a limited line of goods that generally includes milk, bread, soda, and snacks.
446191	Food (Health) Supplement Stores	This U.S. industry comprises establishments primarily engaged in retailing food supplement products, such as vitamins, nutrition supplements, and body enhancing supplements.
722513	Limited-Service Restaurants	This U.S. industry comprises establishments primarily engaged in providing food services (except snack and nonalcoholic beverage bars) where patrons generally order or select items and pay before eating. Food and drink may be consumed on premises, taken out, or delivered to the customer's location. Some establishments in this industry may provide these

		food services in combination with selling alcoholic beverages. Illustrative examples: delicatessen restaurants; pizza delivery shops; family restaurants, limited-service; takeout eating places; limited service pizza parlors.
713930	Marinas	This industry comprises establishments, commonly known as marinas, engaged in operating docking and/or storage facilities for pleasure craft owners, with or without one or more related activities, such as retailing fuel and marine supplies; and repairing, maintaining, or renting pleasure boats.
445210	Meat Markets	This industry comprises establishments primarily engaged in retailing fresh, frozen, or cured meats and poultry. Delicatessen-type establishments primarily engaged in retailing fresh meat are included in this industry. Illustrative examples: baked ham stores; meat markets; butcher shops; poultry dealers; frozen meat shops.

Table 9.1 NAICS Code Details for Stores Included in the Study (continued)

NAICS Code	NAICS Code Description	NAICS Code Definition
447190	Other Gasoline Stations	This industry comprises establishments known as gasoline stations (except those with convenience stores) primarily engaged in one of the following: (1) retailing automotive fuels (e.g., diesel fuel, gasohol, gasoline, alternative fuels) or (2) retailing these fuels in combination with activities, such as providing repair services; selling automotive oils, replacement parts, and accessories; and/or providing food services.
424490	Other Grocery and Related Products Merchants	This industry comprises establishments primarily engaged in the merchant wholesale distribution of groceries and related products (except a general line of groceries; packaged frozen food; dairy products (except dried and canned); poultry products (except canned); confectioneries; fish and seafood (except canned); meat products (except canned); and fresh fruits and vegetables). Included in this industry are establishments primarily engaged in the bottling and merchant wholesale distribution of spring and mineral waters processed by others.
446110	Pharmacies and Drug Stores	This industry comprises establishments known as pharmacies and drug stores engaged in retailing prescription or nonprescription drugs and medicines.
423910	Sporting and Recreational Goods/Suppliers	This industry comprises establishments primarily engaged in the merchant wholesale distribution of sporting goods and accessories; billiard and pool supplies; sporting firearms and ammunition; and/or marine pleasure craft, equipment, and supplies.

445110	Supermarkets/Other Grocery (Excluding Convenience Stores)	This industry comprises establishments generally known as supermarkets and grocery stores primarily engaged in retailing a general line of food, such as canned and frozen foods; fresh fruits and vegetables; and fresh and prepared meats, fish, and poultry. Included in this industry are delicatessen-type establishments primarily engaged in retailing a general line of food.
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Curriculum Vitae

Myra Joy Shapiro, MHS

(443)468-5396 ~ myrajoyshapiro@gmail.com

Education

The Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

PhD Candidate, International Health – Nutrition

Advisor: Dr. Joel Gittelsohn

Expected in January, 2017

Master's of Health Science, International Health – Nutrition

Advisor: Dr. Lawrence Cheskin

May, 2009

Emerson College, Boston, MA

Bachelor of Arts, Theater Studies

May, 2001

Experience

The Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

Doctoral Candidate Researcher, Jan. 2014 – present

- Designed and conducted a mixed methods analysis exploring the use small food stores as a platform to increase access to healthy foods in rural.
- Recruited and collected data from over 200 participants.
- Organized and maintained databases for five datasets.
- Performed quantitative analysis utilizing two forms of generalized linear models with Stata.
- Conducted a qualitative thematic analysis using ATLAS.ti on 27 in-depth interviews.
- Provided guidance to a Master's-level student researcher working on the project on her data analysis and manuscript.

Research Assistant, Jun. 2016 – present

Developed and conducted a systematic review examining the association between animal-source food consumption and stunting in children 6 to 59 months old in low- and middle-income countries

- Created a protocol submitted to PROSPERO.
- Designed searches in 5 major bibliographic databases.
- Reviewed references, abstracted data, assessed risk of bias, and analyzed data.
- Performed article review and data abstraction in English, Portuguese, and Spanish.

- A peer-reviewed article will be produced for publication in a high impact journal.

Teaching Assistant, 2011 – 2015

- Applied subject matter knowledge on international health, the environment and health, nutrition in disease treatment and prevention, and food and nutrition anthropology while serving as a teaching assistant for five courses.
- Evaluated research papers, presentations, weekly assignments, and exams for 150+ students; tracking grades and class participation; and mentored students during individual meetings.

Research Assistant, Jun.-Aug. 2011

- Collaborated on a systematic review investigating the contribution of preterm birth and fetal growth restriction to childhood wasting and stunting in developing countries for the Child Health Epidemiology Research Group (CHERG).
- Searched databases, identified datasets, reviewed article titles, abstracts, and full texts for inclusion to the study, and extracted data.
- Performed article reviews and data extractions from articles in English, Portuguese, and Spanish.

Research Assistant, Feb.-May 2011

- Worked with a team on a systematic review examining the relationship between folic acid supplementation and preterm birth and fetal growth restriction in developing countries for CHERG.
- Performed database searches, identified datasets, pinpointed articles to include into the study based on the review of titles, abstracts, and full texts, and extracted data.
- Executed work in English, Portuguese, and Spanish.

Research Assistant, Sep. 2010-May 2011

- Engaged with a team to conduct a systematic review assessing the relationship between iron deficiency and perinatal mortality and the global prevalence of iron deficiency/anemia for CHERG.
- Carried out database searches, identified datasets, gauged whether to include articles into the study utilizing a review of titles, abstracts, and full texts, and extracted data.
- Completed work in English, Spanish, and Portuguese.

Research Intern, UNICEF, Lucknow, India, May-Aug. 2009

- Collaborated with a team of three on a qualitative research study assessing a behavior change communication training program targeting Health Education Officers/Health Program Managers.

- Conducted a literature review, designed semi-structured interview and focus group discussion guides, compiled and analyzed the data, and produced a final paper.

Research Intern, Department of Nutrition & Endocrinology, Miami Research Associates, Miami, FL, May-Aug. 2006

- Collaborated with the Research Coordinator to research and write protocols for clinical trials of dietary supplements.

Volunteer, Americorps VISTA - ACCION USA, Miami, FL, Sep. 2003 – Aug. 2004

- Applied skills gained from a market research analysis internship in Paraguay to execute outreach and marketing efforts, in Spanish, within the Latino community for a non-profit microfinance organization.

Publications

- Campbell EA, Shapiro MJ, Welsh C, Bleich SN, Cobb LK, Gittelsohn J. Healthy food availability among food sources in rural Maryland counties. (Manuscript submitted to the Journal of Hunger & Environmental Nutrition, April 2016).

Presentations

- Shapiro M, Welsh C, Dennis D, Campbell E, Gittelsohn J. Customer utilization of small stores in rural Maryland and association with diet and psychosocial variables. (Oral presentation at Experimental Biology, Boston, MA, March, 2015).
- Shapiro M, Welsh C, Campbell E, Dennis D, Gittelsohn J. Beverage, milk, snack, fruit, and vegetable purchasing practices in small stores in rural Maryland. (Poster presented at the American Society for Nutrition Advances and Controversies in Clinical Nutrition conference, National Harbor, MD, December 2014).
- Shapiro M, Welsh C, Campbell E, Dennis D, Gittelsohn J. Attitudes and behaviors of customers towards healthy foods among overweight and obese population in small food stores in rural Maryland. (Poster presentation at The Obesity Society annual conference, Boston, MA, November 2014).
- Shapiro M, Welsh C, Campbell E, Dennis D, Gittelsohn J. Healthy foods being sold in small stores in rural Maryland where customers have a high prevalence of overweight and obesity. (Poster presentation at The Obesity Society annual conference, Boston, MA, November 2014).
- Shapiro MJ, Murray-Kolb L, Chang S, Hamadani J, El Arifeen S, Baqui A, Black RE. Maternal depressive symptoms and infant diarrhea in Bangladesh. (Poster presentation at Experimental Biology, San Diego, CA, April 2011).